**DRAFT**

# ENVIRONMENTAL ASSESSMENT

**of the**

**PROPOSED RULE**

**amending the**

**ATLANTIC LARGE WHALE**

**TAKE REDUCTION PLAN**

**DYNAMIC AREA MANAGEMENT**
**Gear Modifications**

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## 1.0 INTRODUCTION

Pursuant to Section 118 of the Marine Mammal Protection Act (MMPA), the National Marine Fisheries Service (NMFS) convened the Atlantic Large Whale Take Reduction Team (ALWTRT or Team) to develop a plan for reducing the incidental by-catch of four primary species of large whale - the North Atlantic right whale (Eubalaena glacialis), humpback whale (Megaptera novaeangliea), fin whale (Balaenoptera physalus), and minke whale (Balaenoptera acutorostrata) - in four commercial fisheries[1] along the Atlantic coast. The Team consists of representatives from the fishing industry, fishery management councils, state and federal resource management agencies, the scientific community, and conservation organizations. The immediate goal of the Team was to draft an Atlantic Large Whale Take Reduction Plan (Plan) to reduce the incidental take of these four large whale species that interact with commercial fisheries to a level less than the potential biological removal level (PBR) within six months of implementation of the Team's plan.

Following the ALWTRT's initial set of meetings, NMFS developed a proposed Plan published on July 22, 1997 (62 FR 16519), which was later modified and finalized on February 16, 1999 (64 FR 7529). Additional gear modifications were published as an interim final rule in December 2000 (65 FR 80368) and a final rule in January 2002 (67 FR 1300, January 10, 2002; 67 FR 15493, April 2, 2002). NMFS also published an interim final rule for a Seasonal Area Management (SAM) program (67 FR 1142, January 9, 2002; 67 FR 65722, October 28, 2002) and a final rule for a Dynamic Area Management (DAM) program in January 2002 (67 FR 1133, January 9, 2002; 67 FR 65722, October 28, 2002). The main tools of the plan include a combination of broad gear modifications and time-area closures (which are being supplemented by progressive gear research), expanded disentanglement efforts, extensive outreach efforts in key areas, and an expanded right whale surveillance program to supplement the Mandatory Ship Reporting System.

## 2.0 PURPOSE AND NEED

The purpose of this document is to examine the impacts to the environment that would result from allowing lobster trap and anchored gillnet gear with certain modifications designed to reduce the risk of entanglement to North Atlantic right whales (right whales) in a Dynamic Area Management (DAM) zone under the DAM program. Although the DAM program envisioned allowing gear with certain modifications in a DAM zone as one management option, NMFS had not yet identified and

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[1] These fisheries include the New England Multispecies sink gillnet fishery, the Gulf of Maine/U.S. Mid-Atlantic lobster trap/pot fishery, the U.S. Mid-Atlantic coastal gillnet fishery, and the Southeastern U.S. Atlantic shark gillnet fishery.

analyzed gear modifications that sufficiently reduce the risk of entanglement as part of that rulemaking. As a result, the only options currently available to NMFS for protecting right whales inside a DAM zone are total closures or an alert requesting the voluntary removal of all gear. The proposed rule would provide a description of the modifications to lobster trap/pot and anchored gillnet gear that the Assistant Administrator (AA) may impose inside a DAM zone as one option to reduce the risk to right whales. Actual restrictions would be imposed on an event-by-event basis in a separate notice delineating the DAM zone and describing the restrictions.

The need for this protective measure is also driven by the goals of the MMPA and Endangered Species Act (ESA). Under the 1994 Amendments to the MMPA, the goal of a Take Reduction Plan is to reduce the incidental take of strategic stocks of marine mammals in commercial fishing operations to below PBR within 6 months of Plan implementation and to insignificant levels approaching a zero mortality and serious injury rate (zero mortality rate goal (ZMRG)) within 5 years of Plan implementation. For right whales these two goals are essentially the same as PBR has been defined as zero. Under the ESA, NMFS is obligated to use its authorities to conserve endangered and threatened species and ensure that actions authorized by the agency, such as fishing in federal waters, are not likely to jeopardize the continued existence of any endangered or threatened species, including right whales. Although there is not consensus on the details of implementation, the Team, states, and NMFS have all identified gear modifications within Dynamic Area Management (DAM) zones as an appropriate tool in the risk reduction strategy.

## 2.1 BACKGROUND

The complete background for the ALWTRP is found in Section 2.1 of the Environmental Assessment published on July 15, 1997 (NMFS 1997). The following background section is in reference to the specific actions to implement Dynamic Area Management to protect right whales.

The February 1999 final rule implements the regulatory tools of the ALWTRP which included a combination of broad gear modifications and time-area closures. However, the regulatory portion of the ALWTRP is supplemented by progressive gear research, expanded disentanglement efforts, extensive outreach efforts in key areas, and an expanded right whale surveillance program to supplement the Mandatory Ship Reporting System.

The Team met on February 22-24, 2000, to determine how to adjust the current Plan to further reduce the possibility of entanglement of large whales, primarily the right whale, in lobster trap and anchored gillnet gear. The Team was informed of the sense of urgency in this task given the continued entanglement of right whales in the face of clear evidence that the population is declining. There was a general understanding from available entanglement data that right whales may encounter fixed gear anywhere. Therefore, the Team looked for measures that could be broadly applied, to supplement the existing time-area closures that are being applied to right whale critical habitat. Following discussion on various alternative actions, the Team recommended that the existing requirement for fishermen to use gear modifications from the Lobster and Gillnet Gear Technology Lists be replaced with specific gear modifications. Data from the last three years of NMFS gear research demonstrated that mandatory gear modifications are cost effective, operationally acceptable to the fishermen, and have a reasonable chance of providing additional entanglement risk reduction for large whales. The Team agreed that the likelihood of right whale movements through State waters was low enough to not require additional regulations within State waters at this time. On December 21, 2000 (65 FR 80368), an interim final rule was published which incorporated the Team's recommendations. The modifications contained in the interim final rule only applied to the New England anchored gillnet and lobster trap fisheries and the Mid-Atlantic lobster trap fishery. These requirements became effective on February 21, 2001.

The December 2000 interim final rule modifies the February 1999 final rule by changing gear requirements for the lobster trap fisheries in the Northeast and Mid-Atlantic and anchored gillnet fisheries in the Northeast segment of the ALWTRP. Components of the December 2000 interim final rule include the following:

- Nearshore and Offshore Lobster Waters were redefined to be consistent with the American Lobster Fisheries Area designations (Areas 1 through 5, and the Outer Cape Management Area);
- The following new gear requirements were imposed for lobster fisheries in the Offshore Lobster Waters (Area 3 and the Area 2/3 overlap):
  - Knotless weak links at the buoy with a breaking strength of 3,780 lb or less
  - Gear marking midway on the buoy line

- The following new gear requirements were imposed for lobster fisheries in the Northern Nearshore Lobster Waters (Areas 1,2, and the Outer Cape Management Area):
  - Knotless weak links at the buoy with a breaking strength of 600 lb or less
  - Multiple trap trawls only – single trap trawls were not allowed
  - Limit of one buoy line on all trawls up to and including 5 traps
  - Gear marking midway on the buoy line

- The following gear requirements were imposed for the lobster trap fishery in the Southern Nearshore Lobster Waters (Areas 4 and 5)
  - Gear marking midway on the buoy line

- The gear technology list was eliminated for the sink gillnet fisheries in the Northeast gillnet waters (East of 72°30'W Long.).

The gear requirements imposed were:
- Knotless weak link at the buoy with a breaking strength no greater than 1,100 lb.
- Weak link placed in the headrope (floatline) at the center of each net panel
- Net strings that contain 20 net panels or less must be anchored with one of three optional anchoring systems
- Gear marking midway on the buoy line

- The Lobster Gear Technology list was changed to reduce the breaking strength for the buoy weak link option to 600 lb or less and require it to be knotless.

Pursuant to Section 7 of the ESA, NMFS has recently reviewed the effect of fishery management activities on species listed as threatened or endangered. On June 14, 2001, NMFS issued biological opinions (BOs) for the monkfish, spiny dogfish, and multispecies Fishery Management Plans (FMP) and Federal regulations for the lobster fishery. The BOs concluded that the fishery management actions, as proposed, had the potential to jeopardize the continued existence of right whales. A reasonable and prudent alternative (RPA) was included in the BOs, which contains a number of measures necessary to avoid jeopardy. Components of the RPA included expanded gear modifications, Seasonal Area Management (SAM), and Dynamic Area Management (DAM).

In January 2002, NMFS concurrently published three rules, which included: 1) a final rule (67 FR 1300, Janaury 10, 2002; 67 FR 15493, April 2, 2002) implementing ALWTRT recommended gear modifications to the ALWTRP, as well as those modifications determined by NMFS as necessary for lobster trap gear in the Offshore Lobster Waters, Southern Nearshore Lobster Waters, anchored gillnet gear in Mid-Atlantic Coastal Waters, and changes to the lobster trap and anchored gillnet take reduction technology lists; 2) an interim final rule (67 FR 1142, January 9, 2002; 67 FR 65722, October 28, 2002) implementing the SAM program that defined two areas based on the annual predictable presence of right whales in which gear restrictions for lobster trap and anchored gillnet gear are required; and 3) a final rule (67 FR 1133, January 9, 2002; 67 FR 65722, October 28, 2002) implementing the DAM program that protects unexpected aggregations of right whales by temporarily restricting lobster trap and anchored gillnet fishing.

The DAM program, which is the subject of this rulemaking, establishes criteria and procedures to temporarily restrict lobster trap and anchored gillnet gear on an expedited basis within defined areas (i.e. DAM zones) north of 40E N. latitude in order to further reduce the risk of entanglement to right whales from these gear types. Under the DAM program, once a DAM zone is identified, NMFS may: 1)require the removal of all lobster trap and anchored gillnet fishing gear for a 15-day period; 2) allow modified lobster trap and anchored gillnet fishing gear within a DAM zone for a 15-day period; and/or 3) issue an alert to fishermen requesting the voluntary removal of all lobster trap and anchored gillnet gear for a 15-day period, and asking fishermen not to set any additional gear in the DAM zone during the 15-day period.  More details on the DAM program, in general, are provided in the Environmental Assessment published on December 27, 2001 (NMFS, 2001) which is available from NMFS and on the ALWTRP internet web page: http://www.nero.nmfs.gov/whaletrp/.

The first DAM action in 2002 was triggered on April 14, 2002, when the NMFS aerial survey team spotted eight right whales approximately 30 nm east of Cape Ann, Massachusetts in an area called Wildcat Knoll.  On April 26, 2002, NMFS published a notice (67 FR 20699) in the Federal Register to announce temporary area and gear restrictions to protect this aggregation right whales off Cape Ann, Massachusetts for 15 days. The restrictions applied to lobster trap and anchored gillnet gear in an area totaling approximately 1,100 $nm^2$ in April and 1,700 $nm^2$ in May and became effective April 29, 2002.  All lobster trap and anchored gillnet fishermen fishing in this area were required to remove all gear by the effective date and could not set any additional gear in the DAM zone during the restricted period.  This DAM zone terminated automatically at the end of the 15-day restricted period.

The second DAM action in 2002 was triggered on June 18, 2002, when the NMFS aerial survey team spotted seventy-five right whales east of Cape Cod, Massachusetts in an area called the Great South Channel. On July 1, 2002, NMFS published a notice (67 FR 44092) in the Federal Register to announce mandatory and voluntary measures off Cape Ann, Massachusetts for 15 days.  The measures applied to lobster trap and anchored gillnet gear in an area totaling approximately 3,500 $nm^2$ and became effective July 1, 2002.  All lobster trap and anchored gillnet fishermen fishing in the mandatory area were required to remove all gear by the effective date and could not set any additional gear in the DAM zone during the restricted period.  All lobster trap and anchored gillnet fishermen fishing in the voluntary area were urged to remove all gear by the effective date and not set any additional gear in the DAM zone during the restricted period. This DAM zone terminated automatically at the end of the 15-day restricted period.

A third DAM action was triggered on November 20, 2002, when the NMFS aerial survey team reported eight right whales east of Portsmouth, New Hampshire, in an area called Jeffreys Ledge.  On December 3, 2002, NMFS published a temporary rule (67 FR 71900) in the Federal Register to announce mandatory restrictions in the DAM zone for a 15-day period.  The measures applied to lobster trap and anchored gillnet gear in an area totaling approximately 1,600 $nm^2$ and became effective December 5, 2002.  All lobster trap and anchored gillnet fishermen in the DAM zone were initially required to remove all gear by the effective date and could not set any additional gear in the DAM zone during the restricted period.  However, following the publication of the temporary rule, an unforseen adverse weather pattern developed, which led NMFS to rescind the mandatory restrictions and replace them with voluntary measures in the DAM zone for the restricted period.  As a result, weather permitting, all lobster trap and anchored gillnet fishermen fishing in the DAM zone were encouraged to remove all gear and not set any additional gear in the DAM zone during the restricted

period. This DAM zone terminated automatically at the end of the 15-day restricted period.

The fourth, and final, DAM of 2002 was triggered on December 19, 2002, when the NMFS aerial survey team spotted four right whales in an area east of Cape Ann, Massachusetts, known as Cashes Ledge. On December 30, 2002, NMFS published a notice (67 FR 79536) in the Federal Register to announce voluntary restrictions in the DAM zone for a 15-day period. The voluntary measures applied to lobster trap and anchored gillnet gear in an area totaling approximately 1,460 $nm^2$ and became effective December 24, 2002. Voluntary measures were implemented in this DAM zone due to poor weather and in consideration of the safety of life at sea. Therefore, weather permitting, lobster trap and anchored gillnet fishermen fishing in the DAM zone were encouraged to remove all gear and not set any additional gear in the DAM zone during the restricted period. This DAM zone terminated automatically at the end of the 15-day restricted period.

## 3.0 ALTERNATIVES

### 3.1 PROPOSED ACTION

The proposed action is to amend the regulations implementing the DAM component of the ALWTRP by identifying gear modifications that NMFS may require after a DAM zone is triggered. These temporary restrictions may affect lobster trap and gillnet fisheries to achieve the goal of further reducing the risk of entanglement of right whales in commercial fishing gear to achieve goals and requirements of the ESA and MMPA. The gear modifications proposed by this action are based on those already implemented in the Seasonal Area Management (SAM) program. The current SAM gear modifications proposed for use as a regulatory option within DAM zones are as follows:

Lobster Trap Gear
Fishermen utilizing lobster trap gear within the portion of the Northern Nearshore Lobster Waters, Southern Nearshore Lobster Waters, Northern Inshore State Lobster Waters, Cape Cod Bay Restricted Area (May 16 through December 31), and Stellwagen Bank/Jeffreys Ledge Restricted Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines and buoy lines must be made entirely of either sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;
- A weak link must be placed at all buoys with a maximum breaking strength of 600 lb; and
- Fishermen utilizing lobster trap gear within the DAM areas must utilize no more than one buoy line per trawl string.

This buoy line must be at the northern or western end of the trawl string depending on the direction of the set.

Fishermen utilizing lobster trap gear within the portion of the Great South Channel Restricted Lobster Area (July 1 through March 31) and Offshore Lobster Waters Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines and buoy lines must be made of either sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;
- A weak link must be placed at all buoys with a maximum breaking strength of 1,500 lb; and
- Fishermen utilizing lobster trap gear within the DAM areas must utilize no more than one buoy line per trawl string. This buoy line must be at the northern or western end of the trawl string depending on the direction of the set.

<u>Anchored Gillnet Gear</u>
Fishermen utilizing anchored gillnet gear within the portion of the Other Northeast Gillnet Waters, Cape Cod Bay Restricted Area (May 16 through December 31), Stellwagen Bank/Jeffreys Ledge Restricted Area, Great South Channel Restricted Gillnet Area (July 1 through March 31), Great South Channel Sliver Restricted Area (July 1 through March 31), and Mid-Atlantic Coastal Waters that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines and buoy lines must be made of sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;
- Each net panel must have a total of 5 weak links with a maximum breaking strength of 1,100 lb each. Net panels are typically 50 fathoms in length, but the weak link requirements would apply to all variations in panel size. These weak links must include 3 floatline weak links. The placement of the weak links on the floatline must be, one at the center of the net panel and one each as close as possible to each of the bridle ends of the net panel. The remaining 2 weak links must be placed in the center of each of the up and down lines at the panel ends;
- Fishermen utilizing gillnets within the DAM areas must utilize no more than one buoy line per net string. This buoy line must be at the northern or western end of the gillnet string depending on the direction of the set; and
- All anchored gillnets, regardless of the number of net panels, must be securely anchored with the holding power of at least a 22 lb Danforth style anchor at each end of the net string.

## 3.2 NO ACTION

The No Action alternative would leave in place the existing regulations promulgated under the ALWTRP's DAM program. Therefore, since the existing DAM regulations do not identify gear modifications that may be allowed in a DAM zone, if a DAM zone were triggered, NMFS would only have the options of requiring the removal of all lobster trap and anchored gillnet gear from a DAM zone or issuing an alert requesting the voluntary removal of all gear.

## 3.3 USE OF SEASONAL AREA MANAGEMENT (SAM) GEAR WITH A SECOND END LINE AND FLOATING LINE ON THE BOTTOM THIRD OF EACH END LINE

Like the proposed action, this alternative would amend the regulations implementing the DAM program by identifying gear modifications for fishing inside a DAM zone. But, this alternative contains some different gear modifications than those described in Section 3.1. The gear modifications under this alternative would use SAM gear identified in Section 3.1, but allow the use of two endlines and floating line on the bottom one-third of each line as follows:

<u>Lobster Trap Gear</u>
Fishermen utilizing lobster trap gear within the portion of the Northern Nearshore Lobster Waters, Southern Nearshore Lobster Waters, Northern Inshore State Lobster Waters, Cape Cod Bay Restricted Area (May 16 through December 31), and Stellwagen Bank/Jeffreys Ledge Restricted Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines must be made entirely of either sinking or neutrally buoyant line. Floating groundlines are prohibited;
- All buoy lines must be made of either sinking or neutrally buoyant line except the bottom portion of the line, which may be a section of floating line not to exceed one-third the overall length of the buoy line;
- Fishermen are allowed to use two buoy lines; and
- A weak link must be placed at all buoys with a maximum breaking strength of 600 lb.

Fishermen utilizing lobster trap gear within the portion of the Great South Channel Restricted Lobster Area (July 1 through March 31) and Offshore Lobster Waters Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines must be made of either sinking or neutrally buoyant line. Floating groundlines are prohibited;
- All buoy lines must be made of either sinking or neutrally buoyant line except the bottom portion of the line, which may be a section of floating line not to exceed one-third the overall length of the buoy line;

- Fishermen are allowed to use two buoy lines; and
- A weak link must be placed at all buoys with a maximum breaking strength of 1,500 lbs.

<u>Anchored Gillnet Gear</u>
Fishermen utilizing anchored gillnet gear within the portion of the Other Northeast Gillnet Waters, Cape Cod Bay Restricted Area (May 16 through December 31), Stellwagen Bank/Jeffreys Ledge Restricted Area, Great South Channel Restricted Gillnet Area (July 1 through March 31), Great South Channel Sliver Restricted Area (July 1 through March 31), and Mid-Atlantic Coastal Waters that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines must be made of sinking or neutrally buoyant line. Floating groundlines are prohibited;
- All buoy lines must be made of either sinking or neutrally buoyant line except the bottom portion of the line, which may be a section of floating line not to exceed one-third the overall length of the buoy line;
- Fishermen are allowed to use two buoy lines;
- Each net panel must have a total of 5 weak links with a maximum breaking strength of 1,100 lbs. Net panels are typically 50 fathoms in length, but the weak link requirements would apply to all variations in panel size. These weak links must include 3 floatline weak links. The placement of the weak links on the floatline must be, one at the center of the net panel and one each as close as possible to each of the bridle ends of the net panel. The remaining 2 weak links must be placed in the center of each of the up and down lines at the panel ends; and
- All anchored gillnets, regardless of the number of net panels, must be securely anchored with the holding power of at least a 22 lb Danforth style anchor at each end of the net string.

## 3.4 USE OF SAM GEAR WITH SECOND END LINE

This alternative would implement the same gear modifications as described in Section 3.1 except that fishermen would be allowed to use two end lines instead of one.

## 4.0 AFFECTED ENVIRONMENT

The affected environment was discussed in detail in Section 6.0 of the Environmental Assessment published on July 15, 1997 (NMFS 1997) and incorporated by reference in Section 4.0 of the December 27, 2001 Environmental Assessment (NMFS 2001). The physical area affected by this action is the region of the East Coast north of 40E N. latitude. The specific areas affected by the action are the Northeast Lobster and Gillnet waters described in Sections 3.1.1 and 3.1.2 of the July 15, 1997, Environmental Assessment. The biological resources potentially affected by this action are also described in detail in the 1997 Environmental Assessment (NMFS 1997) and incorporated by reference in the 2001 Environmental Assessment (NMFS 2001). Updates are provided in Section 5.1 below. The main goal of the ALWTRP is to reduce serious injury and mortality of large whales in commercial fisheries. The proposed action was developed to accomplish that goal by reducing the threat of injury to large whales from entanglement in fixed commercial fishing gear. Therefore, the general effect of this action to large whales (the primary marine resource affected by this action) should be beneficial.

## 4.1 STATUS OF THE LARGE WHALES

The status of the large whales is discussed in detail in Section 2.2 of the Environmental Assessment published on July 15, 1997 (NMFS 1997). The following is provided as an update of that section.

The information in this section is from the 2001 Marine Mammal Stock Assessments (Waring et al., 2001), and from entanglement reports compiled by NMFS between 1998 and 2002. The detailed reports for entanglements up to 1999 are contained in the 2001 SAR. Summaries of the 1999, 2000, 2001, and 2002 entanglements are provided below for each species. Additional information about the population biology and human-caused sources of mortalities and serious injuries is included in the 2001 Marine Mammal Stock Assessments which are available from NMFS and on an internet web page (www.nefsc.nmfs.gov/psb/assesspdfs.htm).

### 4.1.1 North Atlantic Right Whale

Right whales have occurred historically in all the world's oceans from temperate to subarctic latitudes, with their distribution correlated to the distribution of their zooplankton prey (Perry et al. 1999). In both hemispheres they have been observed at low latitudes and nearshore waters where calving takes place, and then tend to migrate to higher latitudes during the summer (Perry et al. 1999).

The scientific literature on right whales has historically recognized distinct eastern and western populations or subpopulations in the North Atlantic Ocean (IWC 1986). Current information on the eastern stock is lacking and it is unclear whether a viable population in the eastern North Atlantic still exists (Brown 1986, NMFS 1991b). This EA will focus on the western North Atlantic subpopulation of right whales which occurs in the proposed action area.

North Atlantic right whales generally occur west of the Gulf Stream. They are not found in the Caribbean and have been recorded only rarely in the Gulf of Mexico. Like other baleen whales, they occur in the lower latitudes and more coastal waters during the winter, where calving takes place, and then tend to migrate to higher latitudes for the summer. The distribution of right whales in summer and fall appears linked to the distribution of their principal zooplankton prey (Winn et al. 1986). New England waters include important foraging habitat for right whales and at least some right whales are present in these waters throughout most months of the year. They are most abundant in Cape Cod Bay between February and April (Hamilton and Mayo 1990; Schevill et al. 1986; Watkins and Schevill 1982) and in the Great South Channel in May and June (Kenney et al. 1986, Payne et al. 1990) where they have been observed feeding predominantly on copepods, largely of the genera Calanus and Pseudocalanus (Waring et al. 1999). Right whales also frequent Stellwagen Bank and Jeffrey's Ledge, as well as Canadian waters including the Bay of Fundy and Browns and Baccaro Banks, in the spring and summer months. Mid-Atlantic waters are used as a migratory pathway from the spring and summer feeding/nursery areas to the winter calving grounds off the coast of Georgia and Florida.

There is, however, much about right whale movements and habitat that is still not known or understood. Based on photo-identification, it has been shown that of 396 identified individuals, 25 have never been seen in any inshore habitat, and 117 have never been seen offshore (IWC 2001). Telemetry data have shown lengthy and somewhat distant excursions into deep water off of the continental shelf (Mate et al. 1997). Photo-id data have also indicated excursions of animals as far as Newfoundland, the Labrador Basin, southeast of Greenland (Knowlton et al. 1992), and Norway (IWC 2001). During the winter of 1999/2000, appreciable numbers of right whales were recorded in the Charleston, S.C. area. Because survey efforts in the Mid-Atlantic have been limited, it is unknown whether this is typical or whether it represents a northern expansion of the normal winter range, perhaps due to unseasonably warm waters.

Data collected in the 1990s suggested that western North Atlantic right whales were experiencing a slow, but steady recovery (Knowlton et al. 1994). However, more recent data strongly suggest that this trend has reversed and the species is in decline (Caswell et al. 1999, Fujiwara and Caswell 2001).

While it is not possible to obtain an exact count of the number of western North Atlantic right whales, IWC participants from a 1999 workshop agreed that it is reasonable to state that the current number of western North Atlantic right whales is probably around 300 (+/- 10%) (IWC 2001). This conclusion was based, in large part, on a photo-id catalog comprising more than 14,000 photographed sightings of 396 individuals, 11 of which were known to be dead and 87 of which had not been seen in more than 6 years. In addition, it was noted that relatively few new non-calf whales (whales that were never sighted and counted in the population as calves) had been sighted in recent years (IWC 2001) suggesting that the 396 individuals is a close approximation of the entire population. Since the 1999 IWC workshop there have been at least 53 right whale births; 1 in 2000, 31 in 2001, and 22 in 2002. In addition, one animal was "resurrected" meaning that it was seen after an absence of at least 6 years. However, at least four of the calves are known to be dead and a fifth was not resighted with its mother on the summer foraging grounds. Three adult right whales are known to have died and two are suspected of having died since the 1999 IWC workshop. Although the "count" of right whales based on the original count of 396 individually identified whales, the number of observed right whale births and the known and presumed mortalities equals 342 animals, for the purposes of this EA, NMFS considers the best approximation for the number of North Atlantic right whales to be approximately 300 (+/- 10%) given that all mortalities are not known. The sightings data and genetics data also support the conclusion that, as found previously, calving intervals have increased (from 3.67 years in 1992 to 5.8 years in 1998) and the survival rate has declined (IWC 2001). Even more alarming, the mortality of mature, reproductive females has increased, causing declines in population growth rate, life expectancy and the mean lifetime number of reproductive events between the period 1980-1995 (Fujiwara and Caswell 2001). In addition, for reasons which are unknown, many (presumed) mature females are not yet known to have given birth (an estimated 70 percent of mature females are reproductively active). Simply put, the western North Atlantic right whale population is declining because the trend over the last several years has been a decline in births coupled with an increase in mortality.

Factors that have been suggested as affecting right whale reproductive success and mortality include reduced genetic diversity, pollutants, and nutritional stress. However, there is no evidence available to determine their potential effect, if any, on western North Atlantic right whales. The size of the western North Atlantic subpopulation of right whales at the termination of whaling is unknown, but is generally believed to have been very small. Such an event may have resulted in a loss of genetic diversity which could affect the ability of the current population to successfully reproduce (i.e., decreased conceptions, increased abortions, and increased neonate mortality). Studies by Schaeff et al. (1997) and Malik et al. (2000) indicate that western North Atlantic right whales are less genetically diverse than southern right whales. However, several apparently healthy populations of cetaceans, such as sperm whales and pilot whales, have even lower genetic diversity than observed for western North Atlantic right whales (IWC 2001). Similarly, while contaminant studies have confirmed that right whales are exposed to and accumulate contaminants, researchers could not conclude that these contaminant loads were negatively affecting right whales since concentrations were lower than those found in marine mammals proven to be affected by PCB's and DDT (Weisbrod et al. 2000). Finally, although North Atlantic right whales appear to have thinner blubber than right whales from the South Atlantic (Kenney 2000), there is no evidence at present to demonstrate that the decline in birth rate and increase in calving interval is related to a food shortage. These concerns were also discussed at the 1999 IWC workshop where it was pointed out that since Calanus sp. is the most common zooplankton in the North Atlantic and current right whale abundance is greatly below historical levels, the proposal that food limitation was the major factor seemed questionable (IWC 2001).

Anthropogenic mortality in the form of ship strikes and fishing gear entanglements do, however, appear to be affecting the status of western North Atlantic right whales. Data collected from 1970 through 1999 indicate that anthropogenic interactions are responsible for a minimum of two-thirds of the confirmed and possible mortality of non-neonate animals (Knowlton and Kraus 2001). Of the 45 right whale mortalities documented during this period, 16 were due to ship collisions and three were due to entanglement in fishing gear (there were also 13 neonate deaths and 13 deaths of non-calf animals from unknown causes) (Knowlton and Kraus 2001). Based on the criteria developed by Knowlton and Kraus (2001), 56 additional serious injuries and mortalities from entanglement or ship strikes are believed to have occurred between 1970 and 1999: 25 from ship strikes and 31 from entanglement. Nineteen were considered to be fatal interactions (16 ship strikes, 3 entanglements). Ten were possibly fatal (2 ship strikes, 8 entanglements), and 27 were non-fatal (7 ship strikes, 20 entanglements) (Knowlton and Kraus 2001). Scarification analysis also provides information on the number of right whales which have survived ship strikes and fishing gear entanglements. Based on photographs of catalogued animals from 1959 and 1989, Kraus (1990) estimated that 57 percent of right whales exhibited scars from entanglement and 7 percent from ship strikes (propeller injuries). This work was updated by Hamilton et al. (1998) using data from 1935 through 1995. The new study estimated that 61.6 percent of right whales exhibit injuries caused by entanglement, and 6.4 percent exhibit signs of injury from vessel strikes. In addition, several whales have apparently been entangled on more than one occasion. Some right whales that have been entangled were subsequently involved in ship strikes. Because some animals may drown or be killed immediately, the actual number of interactions is expected to be higher.

As described in Section 2.1, a previous section 7 consultation on the three FMPs for the Monkfish, Multispecies, and Spiny Dogfish fisheries and the Federal regulations for the American Lobster fishery was concluded on June 14, 2001, and found that proposed activities under these regulations were likely to jeopardize the continued existence of the northern right whale. In response to the jeopardy conclusion, NMFS Protected Resources Division developed one RPA with multiple management components to minimize the overlap of right whales and gillnet and lobster gear, and to expand gear modifications to Mid-Atlantic waters. These measures include: Seasonal and Dynamic Area Management, an expansion of gillnet gear modifications, and continued gear research and modifications. Cumulatively, these measures were developed to eliminate mortalities and serious injuries of right whales in lobster trap and anchored gillnet gear, eliminate serious and prolonged entanglements, and significantly reduce the total number of right whale entanglements in lobster trap and anchored gillnet gear and associated scarification observed on right whales. In addition, the RPA included measures to help monitor the effectiveness of this RPA. For example, if a right whale is killed or seriously injured in lobster trap or anchored gillnet gear, gear that is identifiable as being approved for use in the lobster or gillnet fishery, or gear that cannot be identified as being associated with a specific fishery, this will be considered evidence that the measures outlined in the RPA are not demonstrably effective at reducing right whale injuries or death. Also, if the estimated number of right whale entanglements in any gear or scarring in 2002 and subsequent years increases or remains the same as the lowest annual level of the three preceding years (2002 would be compared with the lowest level that occurred in 1999, 2000, and 2001), this would also constitute evidence that the measures outlined in the RPA are not demonstrably effective at reducing right whale injuries or deaths. The number of new observed right whale entanglements for 1999, 2000, and 2001 were six, five, and three, respectively. Scarification analysis is completed on an annual basis after the end of the calendar year. Thus, scarification analysis for 2002 will be completed after the end of the 2002 calendar year.

Eight right whale entanglements were observed in 2002. The first of these is a male right whale identified as #1424. Right Whale #1424 is an adult male that is at least twenty-one years old. He was first observed entangled on February 12, 2002, off of Amelia Island, FL. Prior to this sighting, he had last been seen (not entangled) on September 17, 2001. The whale is entangled in heavy, marine line (of unknown origin) that may be wrapped around the whale’s rostrum and with a looser loop over the back. Right whale #1424 has been seen four times since February 12, 2002. Poor weather conditions and the whales behavior have affected attempts at disentanglement. The second right whale is a yearling of unknown sex, identified as #3120. This whale was first sighted entangled on April 7, 2002, off of Cape Fear, North Carolina. Images of the whale taken by a party boat captain reveal an entanglement with multiple wraps of line around the body and line in the mouth. The origin of this line has not been identified. This whale was resighted on May 24, 2002, in the Great South Channel approximately 36 nm east of Nantucket, however, the disentanglement team could not respond due to poor weather conditions. Right whale #3120 was last seen (without entangling line) in the company of its mother on December 23, 2001, in the southeast right whale calving area. Based on sightings data, both of the entangled animals spent some time in areas other than where the lobster fishery operates. The American lobster fishery is most abundant in inshore waters from Maine through New Jersey with abundance declining from northern to southern areas. Offshore, it occurs from Maine through North Carolina. The American lobster fishery is not prosecuted south of North Carolina. The third entangled right whale was first sighted by whale watch vessel crews near Brier Island, Nova Scotia in the Bay of Fundy on July 6, 2002. This individual was later identified as #3107, a female born in 2001. There were a number of wraps of line around the tail stock and an orange ball near the flukes. On August 1, 2002, staff from the New England Aquarium (NEAq) on board the R/V *Neried*, encountered the right whale and, under the authority of the Canadian Department of Fisheries and Oceans, unsuccessfully attempted to disentangle the animal. More attempts were made by NEAq team to attach a telemetry buoy and/or to disentangle on August 9 and 10; both were unsuccessful. CCS staff believed this is a life threatening entanglement with serious wounds noted on the tail stock and flukes. During another attempt on September 1, the NEAq team reported that they had cut and removed the entangling line on the tail, and that the whale was disentangled. On September 30, 2002 the NOAA SAS team sighted #3107 east of Cape Cod - they noted fresh peduncle scars, a heavy cyamid load, grayish coloring, and seemingly fat body condition. On October 12, 2002 the carcass of #3107 washed up in Sconset, Nantucket. Necropsy results are pending. A fourth entangled right whale, identified as #1427, an 18 year old male, was first sighted entangled on July 12, 2002, by a recreational boater. The trailing line was shortened and was tagged with a telemetry buoy the evening of July 12. More than 200 feet of 1/2" to 5/8" green line was removed. Images taken at a second sighting show a tight, white line wrapping the forward part of the rostrum. The whale was monitored as it moved south along the eastern coast of the US and was photographed and intercepted on several occasions (7/15 - Kitty Hawk, NC., 7/16 - Cape Hatteras, NC), on July 17, 2002, the telemetry buoy was removed by a well intentioned boater. Despite the loss of the tag, the whale was seen two more times (7/21-Charleston, SC., 7/23-St Simons Island, GA) but efforts to coordinate resources in attempts to reapply the tag were unsuccessful. The fifth entanglement of 2002, a right whale identified as #2320, an adult female of unknown age, was sighted entangled 3 nm west of Boar's Head, Long Island, Nova Scotia, on August 4, 2002. The entanglement is around the rostrum with fairly small diameter, green rope. The lack of trailing gear from this whale has hindered a disentanglement attempt. The entanglement was documented by Canadian Coast Guard and whale researchers, but attempts to apply a telemetry tag or to disentangle were unsuccessful. This whale has not been seen since. Of note, she was seen gear free on August 2, 2002 in the Bay of Fundy, just two days prior to being sighted entangled. A sixth entangled right whale was sighted by Canadian Coast Guard staff in Miramichi Bay, Gulf of St. Lawrence, Canada on August 10, 2002. The whale was temporarily named the "Mirimichi Right Whale," and the only information on this whale comes from Coast Guard description of green rope on the tail and inconclusive photos. <u>It is unclear if this is a newly entangled whale</u>, although the description does not match any other entangled right whales. A seventh entangled right whale, #1815, an adult female, was first sighted entangled on August 22, 2002 in Roseway Basin by a NOAA Fisheries Mammal Sighting Survey. The crew documented the entanglement and took a biopsy of the whale. The line was seen across the back and rostrum. #1815 was last sighted prior to this entanglement on September 20, 2001. #1815 was a mother in 2001 and has given birth to at least two calves. Finally, on August 30, 2002, research vessel Nereid reported an entangled right whale in the Bay of Fundy. The whale was part of a Surface Active Group (SAG) and had tight wraps of line on the rostrum. Photographs by NEAq indicate that the individual is not one of the known entangled right whales to date. This whale was resighted in the Bay of Fundy on September 2 and 26.

The North Atlantic right whales preference for coastal habitat, its proximity to major shipping lanes, and the mechanism by which it feeds (filtering large volumes of water) likely make it more susceptible to fishing gear entanglements and ship strikes as compared to other cetacean species. In addition, North Atlantic right whales also forage in Canadian waters where the species is afforded less protection, and where fishing gear and large ship traffic is also prevalent. For purposes of this EA, NMFS considers the current size of the western North Atlantic right whale subpopulation to be approximately 300 animals ( +/- 10%). Based on recent reviews of the status of right whales (Caswell et al. 1999, IWC 2001, Knowlton and Kraus 2001, Fujiwara and Caswell 2001), NMFS also considers that, despite the birth of 53 right whales over the last two seasons, the current trend indicates an overall decline in calving for unknown reasons, and high anthropogenic mortality occurring from at least two sources (ship strikes and fishing gear entanglement). Recently, the mortality of mature, reproductively active females appears to have increased, although modeling suggests that population declines resulting from these mortalities could be reversed by preventing the deaths of two female right whales per year (Fujiwara and Caswell 2001). However, there is no evidence that the decline of this subpopulation has been reversed, particularly given the continuing level of observed anthropogenic interactions. Therefore, for the purposes of this EA, NMFS considers the western North Atlantic subpopulation of right whales to be declining.

### 4.1.2 Humpback Whale

Humpback whales inhabit all major ocean basins from the equator to subpolar latitudes. They generally follow a predictable migratory pattern in both hemispheres, feeding during the summer in the higher near-polar latitudes and migrating to lower latitudes where calving and breeding takes place in the winter (Perry et al. 1999).

In the North Atlantic, humpback whales calve and mate in the West Indies and migrate to feeding areas in the northwestern Atlantic during the summer months. Most of the humpbacks that forage in the Gulf of Maine visit Stellwagen Bank and the waters of Massachusetts and Cape Cod Bays. Sightings are most frequent from mid-March through November between 41EN and 43EN, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank and Jeffrey’s Ledge (CeTAP 1982) and peak in May and August. Small numbers of individuals may be present in this area year-round, including the waters of Stellwagen Bank. They feed on a number of species of small schooling fishes, particularly sand lance and Atlantic herring, by targeting fish schools and filtering large amounts of water for their associated prey. Humpback whales have also been observed feeding on krill (Wynne and Schwartz 1999).

In winter, whales from the six feeding areas (including the Gulf of Maine) mate and calve primarily in the West Indies where spatial and genetic mixing among these groups occur (Waring et al. 2000). Various papers (Clapham and Mayo 1990, Clapham 1992, Barlow and Clapham 1997, Clapham et al. 1999) summarized information gathered from a catalogue of photographs of 643 individuals from the western North Atlantic population of humpback whales. These photographs identified reproductively mature western North Atlantic humpbacks wintering in tropical breeding grounds in the Antilles, primarily on Silver and Navidad Banks, north of the Dominican Republic. The primary winter range also includes the Virgin Islands and Puerto Rico (NMFS 1991a). Calves are born from December through March and are about 4 meters at birth. Sexually mature females give birth approximately every 2 to 3 years. Sexual maturity is reached between 4 and 6 years of age for females and between 7 and 15 years for males. Size at maturity is about 12 meters.

Humpback whales use the Mid-Atlantic as a migratory pathway to and from the calving/mating grounds, but it may also be an important winter feeding area for juveniles. Since 1989, observations of juvenile humpbacks in the Mid-Atlantic have been increasing during the winter months, peaking January through March (Swingle et al. 1993). Biologists theorize that non-reproductive animals may be establishing a winter feeding range in the Mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. Swingle et al. (1993) identified a shift in distribution of juvenile humpback whales in the nearshore waters of Virginia, primarily in winter months. Identified whales using the Mid-Atlantic area were found to be residents of the Gulf of Maine and Atlantic Canada (Gulf of St. Lawrence and Newfoundland) feeding groups, suggesting a mixing of different feeding populations in the Mid-Atlantic region. Strandings of humpback whales have increased between New Jersey and Florida since 1985 consistent with the increase in Mid-Atlantic whale sightings. Strandings were most frequent during September through April in North Carolina and Virginia waters, and were composed primarily of juvenile humpback whales of no more than 11 meters in length (Wiley et al. 1995).

It is not possible to provide a reliable estimate of abundance for the Gulf of Maine humpback whale feeding group at this time (Waring et al. 2000). Available data are too limited to yield a precise estimate, and additional data from the northern Gulf of Maine and perhaps elsewhere are required (Waring et al. 2000). Photographic mark-recapture analyses from the Years of the North Atlantic Humpback (YONAH) project gave an ocean-basin-wide estimate of 10,600 (95% c.i. = 9,300 - 12,100) (Waring et al. 2000). For management purposes under the MMPA, the estimate of 10,600 is regarded as the best available estimate for the North Atlantic population (Waring et al. 2000).

Humpback whales, like other baleen whales, may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries, coastal development and vessel traffic. However, evidence of these is lacking. There are strong indications that a mass mortality of humpback whales in the southern Gulf of Maine in 1987/1988 was the result of the consumption of mackerel whose livers contained high levels of a red-tide toxin. It has been suggested that red tides are somehow related to increased freshwater runoff from coastal development but there is insufficient data to link this with the humpback whale mortality (Clapham et al. 1999). Changes in humpback distribution in the Gulf of Maine have been found to be associated with changes in herring, mackerel, and sand lance abundance associated with local fishing pressures (Waring et al. 2000).

However, there is no evidence that humpback whales were adversely affected by these trophic changes.

As is the case with other large whales, the major known sources of anthropogenic mortality and injury of humpback whales occur from commercial fishing gear entanglements and ship strikes. Sixty percent of Mid-Atlantic humpback whale mortalities that were closely investigated showed signs of entanglement or vessel collision (Wiley et al. 1995). Between 1992 and 2001 at least 92 humpback whale entanglements and 10 ship strikes (this includes an interaction between a humpback whale and a 33' pleasure boat) were recorded. There were also many carcasses that washed ashore or were spotted floating at sea for which the cause of death could not be determined. Based on photographs of the caudal peduncle of humpback whales, Robbins and Mattila (1999) estimated that at least 48 percent - and possibly as many as 78 percent - of animals in the Gulf of Maine exhibit scarring caused by entanglement. These estimates are based on sightings of free-swimming animals that initially survive the encounter. Because some whales may drown immediately, the actual number of interactions may be higher.

NMFS considers the best estimate for the entire North Atlantic humpback population to be 10,600 but the size of the Gulf of Maine feeding population of humpback whales (the focus of this EA) is unknown. Anthropogenic mortality associated with ship strikes and fishing gear entanglements is significant. The winter range where mating and calving occurs is located in areas outside of the United States where the species is afforded less protection. Despite this, modeling using data obtained from photographic mark-recapture studies estimates the growth rate of the Gulf of Maine feeding population at 6.5 percent (Barlow and Clapham 1997). With respect to the species overall, there are also indications of increasing abundance for the eastern and central North Pacific stocks. However, trend and abundance data is lacking for the western North Pacific stock, the Southern Hemisphere humpback whales, and the Southern Indian Ocean humpbacks. Given the best available information, changes in status of the North Atlantic humpback population are, therefore, likely to affect the overall survival and recovery of the species.

### 4.1.3 Fin Whale

Fin whales inhabit a wide range of latitudes between 20-75E N and 20-75E S (Perry et al. 1999). Fin whales spend the summer feeding in the relatively high latitudes of both hemispheres, particularly along the cold eastern boundary currents in the North Atlantic and North Pacific Oceans and in Antarctic waters (IWC 1992).

During 1978-1982 aerial surveys, fin whales accounted for 24 percent of all cetaceans and 46 percent of all large cetaceans sighted over the continental shelf between Cape Hatteras and Nova Scotia (Waring et al.1998). Underwater listening systems have also demonstrated that the fin whale is the most acoustically common whale species heard in the North Atlantic (Clark 1995). The single most important area for this species appeared to be from the Great South Channel, along the 50m isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffrey's Ledge (Hain et al.1992).

Like right and humpback whales, fin whales are believed to use North Atlantic waters primarily for feeding, and more southern waters for calving. However, evidence regarding where the majority of fin whales winter, calve, and mate is still scarce. Clark (1995) reported a general pattern of fin whale movements in the fall from the Labrador/Newfoundland region, south past Bermuda and into the West Indies, but neonate strandings along the U.S. Mid-Atlantic coast from October through January suggest the possibility of an offshore calving area (Hain et al. 1992).

Fin whales achieve sexual maturity at 5-15 years of age (Perry et al. 1999), although physical maturity may not be reached until 20-30 years (Aguilar and Lockyer 1987). Conception is believed to occur during the winter with birth of a single calf after a 12 month gestation (Mizroch and York 1984). The calf is weaned 6-11 months after birth (Perry et al. 1999). The mean calving interval is 2.7 years (Agler et al. 1993).

The predominant prey of fin whales varies greatly in different geographical areas depending on what is locally available (IWC 1992). In the western North Atlantic, fin whales feed on a variety of small schooling fish (i.e., herring, capelin, sand lance) as well as squid and planktonic crustaceans (Wynne and Schwartz 1999). As with humpback whales, fin whales feed by filtering large volumes of water for their prey through their baleen plates.

The NMFS has designated one population of fin whale for U.S. waters of the North Atlantic (Waring et al. 1998) where the species is commonly found from Cape Hatteras northward although there is information to suggest some degree of separation. A number of researchers have suggested the existence of fin whale subpopulations in the North Atlantic based on local depletions resulting from commercial overharvesting (Mizroch and York 1984) or genetics data (Bérubé et al. 1998). Photoidentification studies in western North Atlantic feeding areas, particularly in Massachusetts Bay, have shown a high rate of annual return by fin whales, both within years and between years (Seipt et al. 1990) suggesting some level of site fidelity. In 1976, the IWC's Scientific Committee proposed seven stocks (or populations) for North Atlantic fin whales. These are: (1) North Norway, (2) West

Norway-Faroe Islands, (3) British Isles-Spain and Portugal, (4) East Greenland-Iceland, (5) West Greenland, (6) Newfoundland-Labrador, and (7) Nova Scotia (Perry et al. 1999). However, it is uncertain whether these boundaries define biologically isolated units (Waring et al. 1999).

Various estimates have been provided to describe the current status of fin whales in western North Atlantic waters. One method used the catch history and trends in Catch Per Unit Effort to obtain an estimate of 3,590 to 6,300 fin whales for the entire western North Atlantic (Perry et al. 1999). Hain et al. (1992) estimated that about 5,000 fin whales inhabit the Northeastern United States continental shelf waters. The 2001 Stock Assessment Report (SAR) gives a best estimate of abundance for fin whales of 2,814 (CV = 0.21). The minimum population estimate for the western North Atlantic fin whale is 2,362 (Waring et al. 2001). However, this is considered an underestimate since the estimate derives from surveys over a limited portion of the western North Atlantic.

Like right whales and humpback whales, anthropogenic mortality and injury of fin whales include entanglement in commercial fishing gear and ship strikes. Of 18 fin whale mortality records collected between 1991 and 1995, four were associated with vessel interactions, although the proximal cause of mortality was not known. From 1996-July 2001, there were nine observed fin whale entanglements and at least four ship strikes. It is believed to be the most commonly struck cetacean by large vessels (Laist et al. 2001). In addition, hunting of fin whales continued well into the 20th century. Fin whales were given total protection in the North Atlantic in 1987 with the exception of a subsistence whaling hunt for Greenland (Gambell 1993, Caulfield 1993). However, Iceland reported a catch of 136 whales in the 1988/89 and 1989/90 seasons, and has since ceased reporting fin whale kills to the IWC (Perry et al. 1999). In total, there have been 239 reported kills of fin whales from the North Atlantic from 1988 to 1995.

The minimum population estimate for the western North Atlantic fin whale is 2,362 which is believed to be an underestimate. North Atlantic fin whales do appear to be less affected by fishing gear as compared to North Atlantic right and humpback whales. However, of these three, it is the most commonly struck by large vessels (Laist et al. 2001). Some level of whaling for fin whales in the North Atlantic may still occur.

Information on the abundance and population structure of fin whales worldwide is limited. NMFS recognizes three fin whale stocks in the Pacific for the purposes of managing this species under the MMPA. These are: Alaska (Northeast Pacific), California/Washington/Oregon, and Hawaii (Angliss et al. 2001). Reliable estimates of current abundance for the entire Northeast Pacific fin whale stock are not available (Angliss et al. 2001). Stock structure for fin whales in the southern hemisphere is unknown and there are no current estimates of abundance for southern hemisphere fin whales. Given the best available information, changes in status of the North Atlantic fin whale population are, therefore, likely to affect the overall survival and recovery of the species.

### 4.1.4 Minke Whale

Minke whales off the eastern coast of the United States are considered to be part of the Canadian east coast population, which inhabits the area from the eastern half of Davis Strait south to the Gulf of Mexico. The best estimate of the population is 4,018 (Waring et al., 2001). The minimum population estimate for Canadian east coast minke whales is 3,515 (ibid). The current and maximum net productivity rates are not known, but the maximum rate is assumed to be 0.04. The PBR for this stock of minke whales is 35 (ibid). Because no minke whale mortalities have been observed since 1991, the annual estimated average Northeast sink gillnet fishery-related mortality for this species is zero (ibid). Annual mortalities attributed to the Mid-Atlantic coastal gillnet fishery, as determined from strandings and entanglement records were 0 in 1991, 1992, 1994, 1995, 1996, 1997, and 1999 and 1 in 1998 (ibid). Estimated average annual mortality related to this fishery during 1995 to 1999 was 0.2 minke whales per year (ibid). Annual mortalities attributed to the Gulf of Maine and Mid-Atlantic lobster trap fishery, as determined from strandings and entanglement records that have been audited, were 1 in 1991, 2 in 1992, 1 in 1994, 1 in 1995, 0 in 1996, 1 in 1997, and 0 in 1998 and 1999 (ibid). Estimated average annual mortality related to this fishery during 1995 to 1999 was 0.4 minke whales per year (ibid).

## 5.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

The MMPA provides goals for the ALWTRP to reduce incidental serious injury and mortality of large whales in commercial fisheries to below PBR and then to insignificant levels approaching a ZMRG. For right whales, this provides the goal of eliminating serious injury or death resulting from incidental take in commercial fisheries. Under the ESA, we must also ensure that any action the agency authorizes, such as commercial fishing for lobster, monkfish, multispecies and dogfish, does not jeopardize the continued existence of right whales. This proposed action was developed to facilitate reaching those goals by reducing the threat of injury to right whales from entanglement in fixed fishing gear. Therefore, the general effect of this action to right whales (the primary marine resource affected by this action) is expected to be beneficial. Other marine mammals who are in an area determined to be a DAM zone may benefit from the imposition of restrictions during the temporary period. Leatherback sea turtles are known to become entangled in lobster buoy lines. However, the entanglement mechanism is similar to what occurs with large whales. Therefore, the environmental consequences of each alternative to leatherback turtles will be similar to that for large whales.

Other species known to be affected by fixed gear are, of course, the fish species for which the gear is targeted. The environmental effects of the gear on targeted species are contained in the environmental documents for their FMPs.

The area affected by the proposed alternatives has been identified as Essential Fish Habitat (EFH) for species within the Northeast multispecies fishery, sea scallops, monkfish, and spiny dogfish. These proposed alternatives will not have an adverse impact on EFH. The basis for this determination is that the gear types involved, gillnet and lobster trap gear, have minimal interaction with EFH.

Lobster trap and anchored gillnet fishermen who operate in the areas that are determined to be DAM zones would also be affected by this action.

## 5.1 PROPOSED ACTION

The proposed action is to amend the regulations implementing the DAM component of the ALWTRP to identify SAM gear modifications as those that NMFS may require fishermen to comply with if they choose to fish in a DAM zone. These proposed requirements would be in addition to the gear modifications currently required under the ALWTRP for the Offshore Lobster Waters, Northern Nearshore Lobster Waters, Southern Nearshore Lobster Waters, Northern Inshore State Lobster Waters, Stellwagen Bank/Jeffreys Ledge Restricted Area (lobster and gillnet area description), Cape Cod Bay Restricted Area (lobster and gillnet area description; May 16 through December 31), Great South Channel Restricted Gillnet Area (July 1 through March 31), Great South Channel Sliver Restricted Area (July 1 through March 31), Other Northeast Gillnet Waters, and Mid-Atlantic Coastal Waters (gillnet area description).

The gear modifications proposed by this action are based on those already implemented in the Seasonal Area Management (SAM) program. The current SAM gear modifications proposed for use as an regulatory option within DAM zones are as follows:

<u>Lobster Trap Gear</u>
Fishermen utilizing lobster trap gear within the portion of the Northern Nearshore Lobster Waters, Southern Nearshore Lobster Waters, Northern Inshore State Lobster Waters, Cape Cod Bay Restricted Area (May 16 through December 31), and Stellwagen Bank/Jeffreys Ledge Restricted Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines and buoy lines must be made entirely of either sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;
- A weak link must be placed at all buoys with a maximum breaking strength of 600 lb at each buoy; and
- Fishermen utilizing lobster trap gear within the DAM areas must utilize no more than one buoy line per trawl string. This buoy

line must be at the northern or western end of the trawl string depending on the direction of the set.

Fishermen utilizing lobster trap gear within the portion of the Great South Channel Restricted Lobster Area (July 1 through March 31) and Offshore Lobster Waters Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines and buoy lines must be made of either sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;
- A weak link must be placed at all buoys with a maximum breaking strength of 1,500 lbs; and
- Fishermen utilizing lobster trap gear within the DAM areas must utilize no more than one buoy line per trawl string. This buoy line must be at the northern or western end of the trawl string depending on the direction of the set.

<u>Anchored Gillnet Gear</u>
Fishermen utilizing anchored gillnet gear within the portion of the Other Northeast Gillnet Waters, Cape Cod Bay Restricted Area (May 16 through December 31), Stellwagen Bank/Jeffreys Ledge Restricted Area, Great South Channel Restricted Gillnet Area (July 1 through March 31), Great South Channel Sliver Restricted Area (July 1 through March 31), and Mid-Atlantic Coastal Waters that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines and buoy lines must be made of sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;
- Each net panel must have a total of 5 weak links with a maximum breaking strength of 1,100 lbs each. Net panels are typically 50 fathoms in length, but the weak link requirements would apply to all variations in panel size. These weak links must include 3 floatline weak links. The placement of the weak links on the floatline must be, one at the center of the net panel and one each as close as possible to each of the bridle ends of the net panel. The remaining 2 weak links must be placed in the center of each of the up and down lines at the panel ends;
- Fishermen utilizing gillnets within the DAM areas must utilize no more than one buoy line per net string. This buoy line must be at the northern or western end of the gillnet string depending on the direction of the set; and
- All anchored gillnets, regardless of the number of net panels, must be securely anchored with the holding power of at least a 22 lb Danforth style anchor at each end of the net string.

### 5.1.1 Biological Impacts

NMFS is proposing to identify SAM modified gear as gear determined by NMFS to sufficiently reduce the risk of entanglement to North Atlantic right whales under the DAM program. Therefore, this proposed rule would allow NMFS to utilize the option of gear modification within a DAM zone. Similar to the discussion provided in the SAM proposed rule (66 FR 59394, November 28, 2001), the first question that must be answered is what is meant by "sufficient risk reduction." It is not feasible, in the typical scientific fashion, to conduct and evaluate experiments on North Atlantic right whale interactions with modified gear. NMFS cannot conduct laboratory or field trials on North Atlantic right whales to collect data. NMFS is able, however, to scrutinize past entanglements and learn from them ways to modify gear so that future serious entanglements do not occur. Since the issuance of the BOs, NMFS has conducted additional analysis of available data including that on the seasonal movement and congregations of right whales, previous entanglements, and the nature and position of gear in the water. Based on these analyses and our knowledge of North Atlantic right whale behavior, NMFS has identified gear modifications that sufficiently reduce the risk of entanglement.

The first category of data that has been evaluated are past records of North Atlantic right whale entanglements to identify fishing gear that has been determined to pose an entanglement risk to right whales. Utilizing entanglement data from 1999-2001, NMFS concluded that fishing line in the water column presents the highest entanglement risk from fishing gear to the North Atlantic right whale. NMFS examined these cases to determine the cause of the entanglement and identified gear modifications that would sufficiently reduce such injuries or mortalities in the future. These cases involved buoyline, floatline, endline and groundline. The proposed gear modifications include provisions to address each of these gear components that have been determined to be sources of entanglement.

Floating line has been identified as the source of North Atlantic right whale entanglement because the line is designed to float in the water column to avoid contact with the bottom of the ocean during lower tides. The slack in the floating line is identified as a source of North Atlantic right whale entanglement. NMFS determined that typical offshore lobster pot gear is configured with approximately 7,000 ft (2,134 m) of floating line. Video recording of typical lobster gear with floating groundline between traps revealed that the line forms large loops in the water column between traps. Similar video recording of neutrally buoyant line between traps revealed that it did not have the same vertical profile as floating line; rather, it was located on or near the bottom and was not available to North Atlantic right whales as an entanglement risk. To minimize interactions between fishing gear and North Atlantic right whales, the proposed rule for DAM gear modifications would prohibit floating line for all lobster pot and gillnet gear within the DAM zones during the restricted period. NMFS estimates that by eliminating floating line and requiring sinking or neutrally buoyant line, approximately 85 percent of the line within the water column would be eliminated.

Vertical line between the gear and the surface system is another source of entanglement. By allowing only a single buoy line per net string for gillnet gear and a single buoy line per trawl for lobster trap gear, the amount of vertical line in the water column is further reduced by 50 percent. It is not technologically feasible at this time to remove all vertical lines from the water column, since there has to be some way for fishermen to haul a line at the surface to bring up gear from the sea floor.

The 85-percent reduction in floating line and 50-percent reduction in vertical line are methods that sufficiently reduce the risk of entanglement to North Atlantic right whales. If the line is not within the water column, the threat of entanglements from these gear components is eliminated.

The measures proposed result in a significant reduction in the volume of line in the water column within a DAM zone. However, line still remains at the one buoy line for both lobster and gillnet gear and in the panels of gillnet gear. The amount of line in the buoy line that is vertical in the water column would be reduced significantly by the proposed prohibition on the use of floating line. To further reduce the risk posed by remaining vertical line, weak links with reduced breaking strengths are proposed as a requirement for the modified gear.

Past entanglements provide evidence that weak links are a critical measure to sufficiently reduce the risk of entanglement of marine mammals, especially right whales. The proposed placement of the weak links is designed to provide key breaking points so that any North Atlantic right whale that does become entangled would be able to break free (by exerting enough force to break a weak link). For gillnet gear allowed to be set in a DAM zone, each net panel would be required to have a total of 5 weak links with a maximum breaking strength of 1,100 lbs (498.9 kg). One floatline weak link would be required to be placed at the center of the net panel and two weak links would be placed as close as possible to each of the bridle ends of the net panel. The remaining two weak links would be placed in the center of each of the up and down lines at either end of each panel. In addition, all anchored gillnets are required to be securely anchored with the holding power of at least a 22 lb (9.9 kg) Danforth-style anchor at each end of the net string. Serious injuries and mortalities have occurred when North Atlantic right whales became wrapped in gear. When a North Atlantic right whale encounters gear that does not have weak links and is not properly anchored then any effort by the whale to free itself of the gear is likely to result in it becoming further and further wrapped up in the gear. Anchoring provides tension so that, when a whale encounters the anchored gear, sufficient tension is placed on the line, which is then likely to break at the weak links resulting in the whale either entirely breaking free of the gear or swimming away with a line or portion of gear rather than being wrapped in the gear. When a portion of the gear remains attached to the whale in this manner, rather than being wrapped around the whale, it can be shed by the whale or may be removed through disentanglement efforts.

In order to evaluate the effectiveness of weak links placed in the float line of gillnets, NMFS conducted investigations simulating an entanglement. NMFS placed strain on fifteen net strings that were anchored and twenty that were not anchored. Trials were run with both 600 lb (272.2 kg) and 1,100 lb (498.9 kg) weak links at three places on the floatline. When strain was applied to the gillnets with proper anchoring systems, the floatline weak line broke with very little net attached. This provides evidence that the weak links can be expected to break when encountering strain such as that placed on it by a marine mammal. The fact that the weak link broke quickly and cleanly provides evidence that an encounter between a North Atlantic right whale and gillnet gear with proper anchoring and the five proposed weak links would sufficiently reduce the risk of entanglement to North Atlantic right whales. It is also important to note that recently a float has been designed and developed that incorporates a weak link, thus allowing fishermen to place weak links in gillnet gear more easily.

In 1997, a study was conducted by the Department of Fisheries, University of Rhode Island, to estimate the tractive force of the North Atlantic right whale. Maximum propulsive force (forward moving burst force) estimates for the North Atlantic right whale ranged from 465 lbs (210.9 kg) for 13 foot (3.9 m) whales to 9,440 lb (4,281.9 kg) for 59 foot whales. Maximum estimates of tractive forces for right whales ranged from 135 lb (61.2 kg) for 13 foot (3.9 m) whales to 6,969 lb (3,161 kg) for 59 foot (17.9 m) whales. Data on objects towed by right whales during rescue operations were also analyzed to determine forces capable of being generated by right whales. During the disentanglement of a 43 foot (13.1 m), 38.6 ton right whale, the Center for Coastal Studies attempted to fatigue the whale by adding an 8-foot (2.4 m) sea anchor, five Norwegian balls, and an inflatable boat. A 42 foot (12.8 m) fishing vessel was also tied to the whale. The vessel and gear were towed by the whale for one hour at a speed of nine knots. The total estimated drag on the whale during this operation ranged from 593 lb to 2,369 lb (268.9 kg to 1,074.6 kg). In addition, during the rescue the whale parted a rope with an estimated breaking strength of 400 lb (181.44 kg). The size of animals in the Bay of Fundy are likely to reflect the size of animals that could trigger a DAM. Seventy-seven animals observed and measured in the Bay of Fundy in 2000 and 2001 ranged in size between 25 to 50 feet (7.5 to 15 m). Of these seventy-seven animals, 86 percent were greater than 33 feet (10 m). Based on this information, it would appear that most right whales that could trigger a DAM zone would be able to exert enough force on the 1,100 lb weak links to break them and thus become free of the gear.

In July 2001, a North Atlantic right whale was observed entangled in offshore lobster gear. The gear investigation determined that the entanglement was in the surface system (consisting of the buoy(s) and high flyer). Weak links were required in the portions of the gear where the entanglement occurred and, based on the gear remaining in the water and what was removed from the whale during disentanglement, it was determined that the weak link had functioned properly and had released the whale from the lobster pots. Based on the gear investigation, it was determined that the weak link allowed the North Atlantic right whale to break away from the majority of the offshore lobster gear, ending up with only a small piece of the line. The whale was completely disentangled by the Center for Coastal Studies except for a short piece of line lodged in the baleen, which was not considered harmful. NMFS concludes that, based on the weak link studies and review of gear configurations involved in entanglements, the additional weak links and lowered breaking strengths in the surface system proposed for the DAM program would have allowed the North Atlantic right whale to free itself of all gear.

The concept of removing floating line from groundlines and buoy lines and the increased use of weak links was supported in discussions with the ALWTRT at its June 27-28, 2001, meeting and in public comments received on the SAM ANPR. The ALWTRT membership includes environmental interests, fishermen, gear experts, state and federal fisheries managers and large whale biologists who are considered experts in their respective fields. This group, as evidenced by the extensive development of additional gear modifications at the June 27-28, 2001, ALWTRT meeting, generally supports gear modifications as an alternative to complete closures.

Level II or Low Risk Gear was proposed as a requirement within a SAM area. A definition developed by a subgroup of the ALWTRT states that Level II or Low Risk Gear is gear for which any entanglement would be minor, meaning where death or serious injury is highly unlikely. NMFS proposed that the gear meeting this definition be required to fish in SAM areas during the specified times. NMFS has concluded that these gear modifications sufficiently reduce the risk of entanglement to right whales and, therefore, proposes that the gear modifications identified in Section 3.1 be required as an option under the DAM program.

The information and analysis provided in this document demonstrates that the gear modifications proposed for DAM (including replacing floating line with neutrally buoyant or sinking line, additional weak links, reduced breaking strengths for weak links and limits on the number of buoy lines) sufficiently reduce the risk of entanglement to right whales. This is achieved by reducing the amount of lobster trap and anchored gillnet gear in the water column and requiring gear modifications that minimize the potential for serious injury or mortality of right whales inside DAM zones. The proposed DAM gear modifications would, therefore, implement the DAM portion of the RPA as described in the June 14, 2001, BOs.

The proposed gear modifications for DAM sufficiently reduce the risk of entanglement to right whales by minimizing the overlap between whales and vertical lines from fishing gear and requiring the use of weak links with reduced breaking strengths. The effectiveness of DAM, in general, and these proposed gear modifications as an alternative management measure for protecting right whales within a DAM zone, however, depends in part on the minimization of delays in achieving a reduction in vertical lines. Delays may be caused by the time between the formation of a concentration of right whales, the observation of that concentration, the time required to prepare and file a Federal Register notice implementing restrictions, and the time period allowed for compliance with the restrictions. If a DAM zone is triggered and the proposed gear modifications are required, the time necessary for compliance may be reduced if lobster trap and anchored gillnet fishermen have already changed their gear over to comply with the SAM time/area restrictions. Furthermore, lobster trap and anchored gillnet fishermen that fish both inside and outside the SAM areas may prefer to change all of their gear over in order to be prepared should a DAM be triggered in the waters where their gear is set. Efforts such as these would minimize the time delays in complying with gear modification requirements in a DAM zone and have the overall benefit of reducing the risk of entanglement to right whales.

### 5.1.2 Economic Impacts

Under the preferred alternative (PA) plan vessels fishing lobster or sink gillnet gear must modify their gear to continue fishing in the DAM area. A sighting of 3 right whales at a density of 0.04 right whales per square nautical mile, will trigger a closure to all lobster trap and sink gillnet gear. Under the PA, a vessel can continue to fish in the DAM area if they convert to low entanglement risk gear. Based on analysis of sightings data from 2000, Clapham and Pace (2000) predicted closures would have been induced 6 times. Four of these six closures are subsumed under Seasonal Area Management (SAM) and one closure is in Canadian waters. Economic impacts are assessed for one DAM closure under this proposed action. Specifically, the one DAM closure occurs from June 20 to July 6, 2000 (Clapham and Pace, 2000).

Several potential scenarios exist as to how the fishing industry may adapt to this proposed action. The scenarios include: 1) convert to gear consistent with SAM gear modifications and continue fishing in DAM; 2) choose not to fish or convert gear; or 3) fish outside of the DAM area, do not convert gear, and move gear back into DAM when it reopens. In scenario 1, vessel profits or revenues will be reduced as a result of incurring the cost of converting to low entanglement risk gear. Under scenario 2, vessels will incur the cost of removing and resetting their gear in DAM, plus forgone revenues from not fishing. Under scenario 3, a vessel may increase or decrease their revenue depending on the catch rates outside of DAM. For example, if the catch rates are greater outside of DAM, we expect there to be revenue gains. It is more likely that vessels fish in areas that maximize their profits and therefore catch rates would be equal or less outside of DAM. Vessels will incur the differences in revenue between fishing inside and outside of DAM, plus the cost of removing their gear from DAM and then resetting it back in DAM when it opens. In the last two scenarios, vessels take on the risk of losing their fishing territory in DAM to another vessel.

A DAM area can be triggered anywhere and at any time outside of SAM areas and the CCBCH and GSCCH restrictive time periods. This proposed rule is an incentive based program. If vessels convert their gear to be consistent with SAM gear requirements and a DAM is triggered within their fishing area they will not have to remove their gear. For analytical purposes we can assess the cost of converting the gear that is being fished within the DAM area only. However, vessels that fish in a DAM area are likely to have gear fishing elsewhere. As an alternative analytical approach, a vessel could choose to convert all their gear to low entanglement risk gear since it is all subject to future and potential DAM closures. In this EA we analyze the second approach. That is, a vessel fishing in the DAM zone will choose to convert all their gear.

The economic analysis of the preferred alternative is divided into three sections. Section 5.1.2.1 and 5.1.2.2 investigates the consequences of scenario 1 for the lobster and sink gillnet fleet, respectively. The results of the first two sections under scenario 1 are then summarized in Section 5.1.2.3. This summary section then ends with a discussion of scenario 2 and 3 as identified above.

### 5.1.2.1 Lobster Fleet

In this section we present the economic impacts of a DAM zone on the lobster fleet. To continue fishing in this area a vessel must convert to low entanglement risk gear. We start this section by presenting the method of a break even analysis. The break even analysis is used to determine whether a vessel can incur these gear conversion costs and continue to fish and earn profits. Next we estimate the material and labor cost of converting to low entanglement risk gear for the average vessel. The economic impact of DAM on the lobster fleet is evaluated next. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable and fixed vessel expenses and we end with a break even analysis results.

<u>Method of Break-Even Analysis</u>
In a break even analysis, the break even quantity identifies how many pounds of lobster a vessel must land before the vessel begins to earn profits. A break even analysis takes into consideration the price per pound of lobster received at the dock (P), the variable cost per pound

of lobster (VC) and total fixed costs the vessels incurs within a year (FC). Formally, the break even quantity $Q_{BE}$ equation is:

$$Q_{BE} = \frac{FC}{P - VC}$$

Total fixed costs were based on the lobster vessel survey data by Gates (1995). The price per pound of lobster is calculated from recorded landings in the 2000 Dealer data. Finally, the variable cost per unit is equal to total variable expenses (Gates, 1995) divided by annual lobster landings per vessel.

The approach is to first examine the break even quantity without the proposed action. Next, the lower bound cost of converting the existing gear to low entanglement risk gear is added to the fixed expenses, and the break even quantity is recalculated. The break even quantity is calculated once more using the upper bound cost of the gear conversion. Finally, we examine how the profitability and the break even quantity for an average vessel is altered under the proposed action, and then determine whether the vessel can absorb these extra costs.

<u>Gear Conversion Costs</u>
Risk reducing lobster gear requires: 1) the use of neutrally buoyant or sinking line on all ground and buoy lines; 2) only 1 buoy line; 3) a weak link (WL) with a breaking strength of 1,500 pounds (a breaking strength of 600 lb is required for Inshore and Nearshore areas identified in Section 3.1) on the high flyer and the buoy ball; and 4) a weak link with a breaking strength of 3,780 pounds just below the water surface.[2]

*Data*
The following data sources were used: 1) Bisack (2000) estimates lower and upper bound numbers of lobster traps fished by area; 2) the NEFSC Gear Specialist (NMFS, *pers. comm.*) provided unit material costs for the gear and labor time required to convert to low risk entanglement gear; and 3) the U.S. Bureau of Labor Statistics provided hourly manufacturing labor rates as a labor rate for modifying gear. Data used in this analysis can be found in Table 5.1.2.1.

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[2] During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively. However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas. Therefore, the analysis of costs incurred is likely to be overestimated.

Table 5.1.2.1
General lobster gear information with unit material and labor costs to estimate the cost of converting to low risk entanglement gear.

| Gear Information | Variable Name | N.Nearshore (Class I and II) | | N.Offshore Class III | |
|---|---|---|---|---|---|
| | | LB | UB | LB | UB |
| Number of Traps | NT | 266 | 800 | 854 | 1800 |
| Number of Trawls | NTR | 17.7 | 53.3 | 21.4 | 45 |
| Length of Line Between Traps | LLBT | 120 | 120 | 180 | 180 |
| Depth of Water | DOW | 177 | 177 | 419 | 419 |
| **Material Costs** | **Variable Name** | **$/unit** | | | |
| 1500 lb Weak Link | WL | | | | |
| 1/4" Polyester Rope (3 feet) | | 0.073 | | | |
| Plastic Swivel | | 2.50 | | | |
| Neutrally Buoyant Line (At 1 foot) | NB | | | | |
| Nearshore - 3/8" | | 0.06 | | | |
| Offshore - 5/8" | | 0.211 | | | |
| **Labor Costs** | **Variable Name** | | | | |
| Time to Measure 100' | TTM | 2 min. | | | |
| Attach a Weak Link | TAWL | 10 min. | | | |
| U.S.Bureau Labor Rate per hour | $LR | $14.05 | | | |

Data from the 2000 NEFSC Vessel Trip Reporting (VTR) logbook system were used to estimate the number of traps fished, which is considered a lower bound (Bisack, 2000). The VTR logbook has recorded fishing activity at the fishing trip level. An upper bound estimate would be the number of traps legally allowed. Vessels effected by DAM will be those fishing in the Northern and Southern Nearshore, Northern Inshore, and Offshore Lobster Waters. Vessels that fish offshore exclusively are allowed to fish 1800 traps and all other vessels have a maximum of 800 traps. Trawls are fished, where a trawl consists of several traps tied together on one line. We assume vessels in the nearshore areas fish 15 traps per trawl, and offshore vessels fish 40 traps per trawl.

The lower and upper bound estimate of trawls fished by Northern Nearshore Lobster Waters vessels is 17.7 and 53.3, respectively

(Bisack, 2000).[3] The lower and upper bound estimate of trawls fished by Offshore Lobster Waters vessels is 21.4 and 45 trawls, respectively.

All ground and buoy lines must be replaced with neutrally buoyant or sinking line. We assume vessels will use neutrally buoyant line over sinking line since it costs less per foot. Vessels fishing in the Offshore Lobster Waters use line that is 5/8" in diameter. Vessels currently use polypropylene.[4] The cost of neutrally buoyant line is $0.211 per foot, versus $0.28 per foot for sinking line. Vessels in the Northern Nearshore or Inshore State Lobster Waters use 3/8" line at a cost of $0.06 per foot of neutrally buoyant line.

There are two choices available for a weak link with a breaking strength of 1,500 pounds. One weak link choice is 1/4" polyester at $0.073 for 3 feet. Alternatively, one may choose a plastic swivel at a unit cost of $2.50.

Total gear conversion costs include materials and labor. According to the U.S. Bureau of Labor, a manufacturing position earns $14.05 per hour. We assume it takes 2 minutes of labor to measure out 100 feet of line (TTM), and 10 minutes to attach a weak link (TAWL).

*Method to estimate the cost to convert to low entanglement risk gear*
Gear conversion costs include the material and labor for replacing all ground and buoy lines with neutrally buoyant line and attaching two 1,500 lb breaking strength weak links. We assume vessels will choose neutrally buoyant line over sinking line since it is currently sold at a lower cost. In addition, neutrally buoyant line may have a longer life since it lies on the surface of the bottom and the fibers of the line will absorb less sediment compared to sinking line which lies beneath the bottom surface. There should be less wear on neutrally buoyant line operationally. A general method is presented here on how to calculate the material and labor costs of these 3 gear conversions.

*Material and labor cost of ground lines*
Material cost of ground lines (MC(GL)) is the product of the number of trawls (NTR), number of traps (NT), the length of line between traps (LLBT), and the dollar price per unit ($/unit). Labor cost of the ground lines (LC(GL)) is the product of the number of trawls (NTR), number of traps (NT), length of line between traps (LLBT), the time to

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[3] Lobster vessels are divided into 3 length classes. Class I are vessels less than 35 feet, Class II are vessels between 36 and 49 feet, and Class III vessels are greater than 49 feet. Class I and Class II vessels fish primarily in northern nearshore vessels and Class III vessels primarily fish in northern offshore waters.

[4] The cost of 5/8" polypropylene is approximately 13.5 cents a foot.

measure 100 feet of line (TTM), and the hourly labor rate ($LR). In equation form we have:

$$MC(GL) = NTR * (NT * LLBT * \$ / unit)$$
$$LC(GL) = NTR * (NT * LLBT * (TTM / 60minutes / 100\ feet) * \$LR)$$

*Material and labor cost of buoy lines*

Material cost of buoy lines (MC(BL)) is the product of the number of trawls (NTR), the depth of the water (DOW), slack for tides (Slack=1.5), and the dollar price per unit ($/unit). Labor cost of the buoy lines (LC(BL)) is the product of the number of trawls (NTR), the depth of water times the slack, the time to measure 100 feet of line (TTM), and the hourly labor rate ($LR). In equation form we have:

$$MC(BL) = NTR * (DOW * Slack * \$ / unit)$$
$$LC(BL) = NTR * (DOW * Slack * (TTM / 60minutes / 100\ feet) * \$LR)$$

*Material and labor cost of weak links*

The material cost of two weak links (MC(WL)) is the product of the number of trawls (NTR), two weak links (WL), and the dollar price per unit ($/unit). We multiply the material cost by 50 percent since we assume vessels will use plastic swivels on half the gear and a ROABS on the remaining gear. Therefore the total material cost is the sum of the cost of plastic swivels and ROABS. Labor cost of the weak links (LC(WL)) is the product of the number of trawls (NTR), two weak links (WL), the time to attach a weak link (TAWL), and the hourly labor rate ($LR).[5] In equation form we have:

$$MC(WL) = NTR * (2\ WL * \$ / unit) * 0.5\ of\ the\ gear$$
$$LC(WL) = NTR * (2\ WL * (TAWL / 60minutes) * \$LR)$$

*Cost to convert to low entanglement risk gear*

The lower and upper bound cost per vessel to convert to low entanglement risk gear in the Northern Nearshore Lobster Waters is $2,493 and $7,508, respectively (Table 5.1.2.2). In the Offshore Lobster Waters, the lower and upper bound cost per vessel is $36,285 and $76,298, respectively. The largest cost component is the material cost of replacing existing ground lines with neutrally buoyant line. In the Northern Nearshore Lobster Waters, material cost of neutrally buoyant ground line is 77 percent of the total cost and it consumes 90 percent of the total cost for the Offshore Lobster Waters vessels.

We assume a vessel will take a 3 year business loan to pay for the up-front material and labor costs of converting to low entanglement risk

[5] Each lobster trawl typically has one buoy line at the end of each trawl. We assume a vessel will detach one buoy line within normal fishing operations at no cost.

gear.[6] Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here. For a vessel fishing in the Northern Nearshore Lobster Waters, the lower bound gear conversion cost is $2,493 (Table 5.1.2.2), and annual payments are $944 with a total loan payment of $2,833. With the upper bound cost of $7,508, annual payments are $2,843 with a total loan payment of $8,530. For a vessel fishing in the Offshore Lobster Waters, the lower bound gear conversion cost is $36,285, and annual payments are $13,745 with a total loan payment of $41,234. With the upper bound gear conversion cost of $76,298, annual payments are $28,902 with a total loan payment of $86,707.

Table 5.1.2.2
Cost per vessel to convert to low risk entanglement gear

| Gear Change | Cost of | N.Nearshore ($1) (Class I and II) | | N.Offshore ($1) (Class III) | |
|---|---|---|---|---|---|
| | | LB | UB | LB | UB |
| NB on BL | Material | 282 | 849 | 2,833 | 5,957 |
| | Labor | 22 | 66 | 63 | 133 |
| | Vessel Total | 304 | 915 | 2,896 | 6,090 |
| NB on GL | Material | 1,912 | 5,757 | 32,511 | 68,364 |
| | Labor | 149 | 449 | 722 | 1,517 |
| | Vessel Total | 2,061 | 6,206 | 33,233 | 69,881 |
| Weak Link | Material | 45 | 137 | 56 | 116 |
| | Labor | 83 | 250 | 100 | 211 |
| | Vessel Total | 128 | 387 | 156 | 327 |
| Grand Total | Vessel Total | 2,493 | 7,508 | 36,285 | 76,298 |

DAM

*Estimate of the number of vessels*

Data from aerial surveys in 2000 were used to retrospectively evaluate the application of the recommended DAM triggers. Based on the analysis of this data, six DAM zones would have been triggered in 2000. However, four of the six hypothetical DAM zones would have been subsumed under the Seasonal Area Management (SAM) program, and another DAM would have occurred within Canadian waters, which are outside of United States jurisdiction. Therefore, the implacts were assessed with respect to one hypothetical DAM zone from June 20 to July 6. The

[6] The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, *pers. comm.*). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

lower and upper bound estimate of vessels fishing lobster gear in the DAM area from June 20 to July 6 is 7 and 29, respectively. In addition, data from NEFSC's 2000 Vessel Trip Report (VTR) logbook were used. According to these data, a total of 183 vessels had recorded fishing activity in the Northern Nearshore and Offshore Lobster Waters. DAM falls within these two management areas. Of these 183 vessels, 3.8 percent (7 vessels) had recorded fishing activity in the DAM area.

The upper bound estimate of vessels fishing in DAM is 29 vessels. Using Bisack (2000) approximately 172 vessels potentially fish in the Offshore Lobster Waters and 677 vessels potentially fish in the Northern Nearshore Lobster Waters. According to the VTR, approximately 3.8 percent of the vessels fish in DAM. Therefore, the upper bound estimate of vessels fishing in DAM is 29 (=0.038*(172+677)). For this analysis we will assume the number of vessels fishing in DAM is 29 from June 20 to July 6.

Forty three percent of the vessels (3 vessels) were Class I and the remaining 57 percent were in Class II. Although the larger Class II vessels have the capability of fishing offshore, their fishing records show activity in the Northern Nearshore and Offshore Lobster Waters. Lobster Management Area (LMA)1 and the Off Cape Area (OCA) are a subset of the Northern Nearshore Lobster Waters. These vessels had fishing activity in LMA 1, OCA and offshore (LMA 3), with a the majority of fishing occurring in nearshore and inshore waters. Therefore, all 13 vessels (13=29*0.43) in length Class I and 16 vessels (16=29*0.57) in length Class II are allowed a legal maximum of 800 traps. We assume vessels fishing in this area fish 15 traps per trawl. Using Bisack (2000), the lower and upper bound estimate of the number of trawls fished are 17.7 and 53.3, respectively (Table 5.1.2.1).

*Revenues*
According to the 2000 VTR, Class I vessels fished 79 days (CV=0.69), earned $59,700 (CV=0.49) in revenues and landed 14,900 pounds of lobster per year. In contrast, Class II vessels fished 80.8 days (CV=0.41), earned $152,600 (CV=0.26) in revenues by landings 38,100 pounds of lobster per year.

*Variable and Fixed Vessel Expenses*
In Gates analysis (1995), Class I vessels were 33 feet in length and fished 159 days per year. According to the VTR, there were 3 Class I vessels fishing in DAM fished 79 days (CV=0.69) per year. Variable expenses and some fixed expenses such as insurance, interest and loans and property taxes were prorated from 159 days to 79 days.[7] A 2000

[7] Based on the annual days at sea, these vessels appear to be part-time versus full-time fishing vessels. Variable and some fixed expenses are therefore scaled according to their time at sea, since we

producer price index was then applied to the 1995 prorated cost estimates. Finally, annual variable expenses for Class I vessels are $17,478 and annual fixed expenses are $10,885, for a total of $28,363 (Table 5.1.2.3).

Table 5.1.2.3.
Variable and Fixed Expenses for DAM Class I lobster vessels

| Variable Expenses | Year 2000 |
|---|---|
| Boat Repair and Maintenance - By Yard | 434 |
| Boat Repair and Maintenance - By Owner | 1,139 |
| Supplies (Store) | 744 |
| Food | 330 |
| Gear Maintenance (Normal Use) | 1,488 |
| Fuel and Lubricants | 1,496 |
| Bait | 4,360 |
| Vehicles | 1,170 |
| Sternman Payment | 6,318 |
| Total | $17,478 |
| **Fixed Expenses** | **2000** |
| Licence and Permits | 208 |
| Mooring & Docking Fees | 989 |
| Interest on Loans (Operating) | 1,009 |
| Interest on Loans (Long Term) | 2,639 |
| Insurance (Boat) | 828 |
| Insurance (Sternman) | 388 |
| Property Taxes | 440 |
| Losses of Gear and Equipment | 2,872 |
| Fixed Cost on Shore front Property | 1,510 |
| Total | $10,885 |

Gates analysis (1995) of Class II vessels had an average length 40 feet and fished 166 days per year on average. According to the VTR, the 5 Class II vessels fishing in DAM, were 39 feet in length and fished 80.8 day per year on average. Annual variable and fixed vessel expenses were prorated from 166 days to 80.8 days.[8] In 2000, annual variable expenses for these Class II vessels were $26,277 and annual fixed expenses were $8,848 for a total of $35,125 (Table 5.1.2.4).

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would not expect a part-time fisher to be as invested in fixed costs such as property taxes compared to a full-time fishing vessel.

[8] A scale adjustment for variable and some fixed costs are also made for these Class II vessels, as applied above with the Class I lobster vessels.

These vessels typically fish with 1 to 2 crew members including the captain.

Table 5.1.2.4.
Variable and Fixed Expenses for DAM Class II lobster vessels.

| Variable Expenses | Year 2000 |
| --- | --- |
| Boat Repair and Maintenance - By Yard | 480 |
| Boat Repair and Maintenance - By Owner | 1,528 |
| Supplies (Store) | 1,233 |
| Food | 593 |
| Gear Maintenance (Normal Use) | 1,779 |
| Fuel and Lubricants | 2,612 |
| Bait | 4,389 |
| Vehicles | 1,455 |
| Sternman Payment | 12,208 |
| Total | $26,277 |
| **Fixed Expenses** | **2000** |
| Licence and Permits | 161 |
| Mooring & Docking Fees | 1,638 |
| Interest on Loans (Operating) | 636 |
| Interest on Loans (Long Term) | 1,432 |
| Insurance (Boat) | 1,044 |
| Insurance (Sternman) | 318 |
| Property Taxes | 2,993 |
| Losses of Gear and Equipment | 312 |
| Fixed Cost on Shore front Property | |
| Total | $8,848 |

*Results of a Break Even analysis of the PA within DAM*
Class I lobster vessels
Without the proposed alternative, Class I lobster vessels have a break even quantity of 3,848 pounds of lobster, which is 26 percent of their annual landings (Table 5.1.2.5). That is, they start to earn a profit when they land more than 3,848 pounds. Business decisions involving gear conversions are based on an annual time frame versus a seasonal time frame. The break even quantity increases by 9 percent and 26 percent for the lower and upper bound gear conversion cost. At the upper bound, the break even quantity is 33 percent of annual landings, compared to 26 percent without the regulation.

These length Class I vessels earn annual profits of $31,337 and land 14,900 pounds of lobster per year on average (Table 5.1.2.5). If a Class I lobster vessel incurred the lower or upper bound cost of converting to low risk entanglement gear, annual profits would decrease by 3.0 percent and 9.0 percent, respectively. The annual payment of the upper bound gear conversion cost is $2,833. Based on this analysis, if these Class I DAM lobster vessels incur the upper bound cost of converting their gear they may continue to fish and earn profits.

Table 5.1.2.5.
Break Even analysis of DAM Class I lobster vessels (PA)

| BE Components | Unit | Before Regulation | PA LB | PA UB |
|---|---|---|---|---|
| Price | $ | 4 | 4 | 4 |
| VC/unit | $ | 1.17 | 1.17 | 1.17 |
| Fixed (FC) | $ | 10,885 | 11,829 | 13,728 |
| BE Units | pounds | 3,848 | 4,182 | 4,853 |
| Percent Increase | | | (+9%) | (+26%) |
| Revenue and Lobster Landings | | | | |
| | | Annual | | |
| Revenue | $ | 59,700 | | |
| Cost | $ | 28,363 | | |
| Profits | $ | 31,337 | | |
| Profit % Reduction | LB | 3.0% | | |
| | UB | 9.0% | | |
| Landings | pounds | 15,000 | | |

Class II lobster vessels
Without the proposed alternative, Class II vessels have a break even quantity of 2,672 pounds of lobster, which is 7 percent of their annual landings (Table 5.1.2.6). We assume these vessels make business decisions about gear conversions based on an annual time frame versus a seasonal time frame. The break even quantity would increase by 10.7 percent and 32.1 percent for the lower and upper bound gear conversion cost. At the upper bound, the break even quantity is 9 percent of annual landings, compared to 7 percent without the regulation.

Vessels earned annual profits of $117,475 and land 38,100 pounds of lobster per year on average (Table 5.1.2.6). If a Class II vessel incurred the lower and upper bound cost of converting to low risk entanglement gear, annual profits would decrease by 0.8 percent and 2.4 percent, respectively. This profit reduction is based on a one year versus 3 year term loan payment. If vessels incur the upper bound cost of converting their gear they may continue to fish and earn profits.

Table 5.1.2.6.
Break Even analysis of DAM Class II lobster vessels (PA)

| BE Components | Unit | Before Regulation | PA | |
|---|---|---|---|---|
| | | | LB | UB |
| Price | $ | 4 | 4 | 4 |
| VC/unit | $ | 0.69 | 0.69 | 0.69 |
| Fixed (FC) | $ | 8,848 | 9,792 | 11,691 |
| BE Units | pounds | 2,672 | 2,957 | 3,531 |
| Percent Increase | | | (+10.7%) | (+32.1%) |
| Revenue and Lobster Landings | | | | |
| | | Annual | | |
| Revenue | $ | 152,600 | | |
| Cost | $ | 35,125 | | |
| Profits | $ | 117,475 | | |
| Profit % Reduction | LB | 0.8% | | |
| | UB | 2.4% | | |
| Landings | pounds | 38,100 | | |

5.1.2.2 Sink Gillnet Fleet

In this section we present the economic impacts of one DAM zone on the sink gillnet fleet. To continue fishing in these areas a vessel must convert to low entanglement risk gear. We start this section by presenting a method to determine a vessel's profits. We then estimate how much profits will change under this regulation. The change in profits under this regulation is a function of the material and labor cost of converting to low entanglement risk gear for the average vessel, which is presented next. The economic impact of DAM on the sink gillnet fleet follows. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable and fixed vessel expenses and we end with the results of a vessel profit analysis.

<u>Method of estimating vessel profits</u>
Vessel profits are based on the layman system, which is used here. Under the sink gillnet fishery layman's system, trip operating costs are removed from trip revenues first. Then 50 percent of the remaining revenues are paid to the captain and crew for labor. The split between members on the vessel depends on level of experience. The remaining revenues (50 percent) are paid to the boat. Annual profits are equal to annual revenues minus variable and fixed expenses, times fifty percent. Next we determine whether a vessel can absorb the cost of converting to low risk whale entanglement gear, by

evaluating the change in profits as a result of this proposed regulation.

<u>Gear Conversion Costs</u>
Risk reducing sink gillnet gear requires: 1) the use of neutrally buoyant or sinking line on all ground, buoy and anchor lines; 2) only 1 buoy line; 3) a weak link (WL) with a breaking strength of 1,100 pounds on the high flyer and the buoy ball; 4) 5 weak links of 1,100 lb breaking strength on each net panel; 5) a weak link with a breaking strength of 3,780 pounds just below the water surface;[9] and 6) a anchor with holding power of at least a 22 pound Danforth-style anchor or greater at the end of each sink gillnet string.

*Data*
The following data sources were used: 1) Bisack (2000) provides estimates of the number of sink gillnet vessels and quantity of gear fished by area; 2) the NEFSC Gear Specialist (NMFS, *pers. comm.*) provided unit material costs for the gear and labor time required to convert to low entanglement risk gear; and 3) the U.S. Bureau of Labor Statistics provided hourly manufacturing labor rates. Data used in this analysis can be found in Table 5.1.2.7.

NEFSC observer data were used to estimate the quantity of gear fished, and NEFSC Vessel Trip Reporting (VTR) logbook and Dealer data were used to estimate the number of sink gillnet vessels fishing by area in Bisack (2000). In the northern nearshore area, sink gillnet vessels fish 10.3 net panels per string and 4.8 strings per trip on average(Table 5.1.2.7).[10] In the northern offshore area, sink gillnet vessels fish 18.4 net panels per string and 10.7 strings per trip.

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[9] During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively. However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas. Therefore, the analysis of costs incurred is likely to be overestimated.

[10] Sink gillnet vessels are divided into 2 length classes. Class I are vessels less than 40 feet and Class II sink gillnet vessels are 40 feet and greater. Typically vessels fishing in the northern nearshore waters are Class I vessels, and vessels fishing in the northern offshore area are Class II vessels.

Table 5.1.2.7
General sink gillnet gear information and unit material and labor costs to estimate the cost of converting to low risk entanglement gear.

| Gear Information | Variable Name | N.Nearshore (Class I) | N.Offshore (Class II) |
|---|---|---|---|
| Number of Strings | NS | 4.8 | 10.7 |
| Number of Net Panels | NNP | 10.3 | 18.4 |
| Height of Net Panel | HNP | 10 feet | 10 feet |
| Depth of Water | DOW | 177 feet | 419 feet |
| Length of Anchor Line | LAL | 100 feet | 100 feet |
| **Material Costs** | **Variable Name** | **$/unit** | |
| 1100 lb Weak Link | WL | | |
| 1/4" Polyester Rope (3feet) | | 0.073 | |
| 3780 lb Weak Link | | | |
| 7/16" polypropylene (3feet) | | 1.00 | |
| Breakaway Float on panel | | 3.00 | |
| Neutrally Buoyant Line (@ 1 foot) | NB | 0.04 | |
| Nearshore - 3/8" | | 0.06 | |
| Offshore - 5/8" | | 0.211 | |
| **Labor Costs** | **Variable Name** | | |
| Time to Measure 100' | TTM | 2 min. | |
| Attach a Weak Link | TAWL | 10 min. | |
| U.S.Bureau Labor Rate | $LR | $14.05/hr | |

*Method to estimate the cost to convert to low entanglement risk gear*
Gear conversion costs include the material and labor for replacing lines with neutrally buoyant line and attaching weak links. Based on observed sink gillnet trips, vessels currently use anchors with holding powers of at least a 22 lb Danforth-style anchor or more and, therefore, this is a no cost item. We assume vessels choose neutrally buoyant line over sinking line since it is currently sold at a lower cost. A general method is presented here on how to calculate the material and labor costs of these gear conversions.

*Material and labor cost of ground and anchor lines*
The ground line runs from the end net panel to the anchor line. The length of the anchor line is approximately 100 feet. The ground line to the anchor line is the height of the net panel which is 10 feet on

average times a slack factor of 1.5. Therefore, at the end of each string, one anchor and ground line is 115 feet.

Material cost of ground and anchor lines (MC(AGL)) is the product of the number of strings (NS), two string ends (SE) ,the length of anchor and ground line (AGL), and the dollar price per unit ($/unit). Labor cost of the anchor and ground lines (LC(AGL)) is the product of the number of strings (NS), the length of the anchor and ground line (AGL), the time to measure 100 feet of line (TTM) plus 2 minutes to attach, and the hourly labor rate ($LR). In equation form we have:

$$MC(AGL) = NS * 2\ SE * AGL * \$ / unit$$
$$LC(AGL) = NS * 2\ SE * AGL * ((TTM / 60minutes / 100\ feet) + 2 / 60) * \$LR$$

*Material and labor cost of buoy lines*
Material cost of buoy lines (MC(BL)) is the product of the number of strings (NS), the depth of the water (DOW), slack for tides (Slack=1.5), and the dollar price per unit ($/unit). Labor cost of the buoy lines (LC(BL)) is the product of the number of strings (NS), the depth of water times the slack, the time to measure 100 feet of line (TTM), and the hourly labor rate ($LR). In equation form we have:

$$MC(BL) = NS * DOW * Slack * \$ / unit)$$
$$LC(BL) = NS * (DOW * Slack * (TTM / 60minutes / 100\ feet) * \$LR)$$

*Material and labor cost of 1,100 pound weak links*
Five 1,100 pound weak links are required on each net panel. In the 2000 gear regulation, one 1,100 pound weak link was required on each net panel. Therefore, under this proposed alternative, four 1,100 weak links must be added. In addition, one 1,100 pound weak links is required on the high flyer and one on the buoy ball. In the 2000 gear regulation, one 1,100 pound weak link was required on the buoy line. Therefore only one 1,100 weak link is required on the buoy line under this proposed alternative.

The number of 1,100 pound weak links per string (WLS) is equal to 1 weak link at the buoy line per string (WL at BL) plus 4 weak links times the number of net panels per string (4 WL *NNP). The material cost of 1,100 pound weak links (MC(WL)) is then equal to the number of strings fished per trip (NS) times the number of weak links per string (WLS), and the dollar price per unit ($/unit). Labor cost of the weak links (LC(WL)) is the product of the number of strings (NS), the number of weak links per string (WLS), the time to attach a weak link (TAWL), and the hourly labor rate ($LR). In equation form we have:

$$WLS = 1\ WL\ at\ BL\ +\ 4\ WL\ *\ NNP)$$
$$MC(WL) = NS * WLS * \$ / unit$$
$$LC(WL) = NS * WLS * (TAWL / 60minutes) * \$LR$$

There are two types of 1,100 pound weak links. One type of weak link is a 1/4" polyester rope which can be spliced in for a total cost of 7.3 cents per 3 foot weak link. As an alternative, Eric Dedoes of Somerville, Maine designed a small, melon sized football-shaped float that breaks away easily if a whale becomes entangled in a fishing net. The device is called a break-away float. If the break-away floats are available, the unit cost would be $3.

*Cost to convert to low entanglement risk gear*
The cost per vessel to convert to low entanglement risk gear in the northern nearshore area and northern offshore area is $779 and $4,085, respectively (Table 5.1.2.8). For the nearshore vessels, the cost of installing 1,100 weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link is $489, $82, $196, and $11, totaling $779. Similarly it costs $1,927, $1,450, $681, and $25 to install 1100 weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link[11], respectively. The largest cost component for both vessel types is the 1100 pound weak links. If the break-away floats are available, the total cost per vessel for a nearshore vessel and offshore vessel is $1,357 and $6,389, respectively (Table 5.1.2.8).

[11] During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively. However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas. Therefore, the analysis of costs incurred is likely to be overestimated.

Table 5.1.2.8
Total cost of converting to low entanglement risk gear per sink gillnet vessel.

| Gear Item | Gear Change | Cost Type | N.Nearshore ($1) (Class I) | N.Offshore ($1) (Class II) |
|---|---|---|---|---|
| 1 | 1100 lb WL on Net Panels, High Flyer and Ball | NWL per string | 42.2 | 74.6 |
| | | Material | 14.79 | 58.27 |
| | | Labor | 474.33 | 1,869.17 |
| | | Vessel Total | 489.12 | 1,927.44 |
| 2 | NB Buoy Line | Material | 76.49 | 1,418.96 |
| | | Labor | 5.97 | 31.50 |
| | | Vessel Total | 82.46 | 1,450.46 |
| 3 | NB on Anchor & Ground Line | Material | 66.24 | 519.27 |
| | | Labor | 130.21 | 161.86 |
| | | Vessel Total | 196.45 | 681.13 |
| 4 | 3780 lb WL on Buoy Line | Material | 0.19 | 0.43 |
| | | Labor | 11.24 | 25.06 |
| | | Vessel Total | 11.43 | 25.49 |
| Grand Total (1-4) | | Vessel Total | 779 | 4,085 |
| 5 | Breakaway Float | Material | 593 | 2,363 |
| | | Labor | 474 | 1,869 |
| | | Vessel Total | 1,067 | 4,232 |
| Grand Total (2-5) | | Vessel Total | 1,357 | 6,389 |

We assume a vessel will take a 3 year business loan to pay for the up-front material and labor costs of converting to low entanglement risk gear.[12] Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here. For a Class I vessel, the lower bound gear conversion cost is $799 (Table 5.1.2.8), and annual payments are $295 with a total loan payment of $885. With the upper bound cost of $1,358, annual payments are $514 with a total loan payment of $1,543. For a Class II vessel fishing in the offshore area, the lower bound gear conversion cost is $4,642, and annual

[12] The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, *pers. comm.*). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

payments are $1,547 with a total loan payment of $4,642. With the upper bound gear conversion cost of $6,389, annual payments are $2,420 with a total loan payment of $7,261.

DAM

*Estimate of the number of vessels*

According to the 2000 VTR there were 16 sink gillnet vessels fishing in the DAM closure from June 20 to July 6, 2000. Of these 16 vessels, 4 vessels were less than 40 feet (Class I) in length with an average of 39 feet (CV=0.04), and 12 vessels were greater than 40 feet in length (Class II) with an average of 44.6 feet (CV=0.07).

*Revenues*

According to the 2000 VTR logbook, annual revenues for Class I vessels were $162,200 (CV=0.52) and they landed 113,100 (CV=0.57) pounds of multi-species fish per year. Class II vessels earned annual revenues of $288,100 (CV=0.43) and landed 256,500 (CV=0.55) pounds of multi-species fish per year.

*Variable and Fixed Vessel Expenses*

Total variable expenses for a Class I vessel were $8,900 (CV=0.42) per year. This includes the cost of fuel, ice, water, food, bait and oil. 1996 to 2001 NEFSC observer data were used to develop this estimate which is based on a cost per days absent from port. These four vessels were absent 86.3 (CV=0.33) days per year on average.

Fixed expenses include the replacement cost of lost gear, annual gear replacement such as the panel webbing, license and docking fees. We assume sink vessels under 40 feet in length incur expense of $1,197 (=$208+$989) for licenses, permits, mooring and docking fees similar to lobster vessels less than 35 feet in length (Table 5.1.2.3). Given a vessel losses one string of sink gillnet gear per year, the replacement cost is $1,985 and it costs $2,225 to replace the panel webbing annually for a total of $4,210 (Table 5.1.2.9). Annual fixed costs are therefore $5,407.[13] Annual variable and fixed vessel expenses for a Class I sink gillnet vessel is $14,300 on average.

[13] This estimate is considered downwardly biased since it does not include interest and loan payments, insurance, property taxes or fixed costs for shore front property.

Table 5.1.2.9
Annual cost of replacing webbing in net panels and replacing 1 string for the average sink gillnet vessel

| Gear Descriptions | N.Nearshore ($1) (Class I) | N.Offshore ($1) (Class II) |
|---|---|---|
| Annual cost of replacing webbing | 2,225 | 8,860 |
| Replacement of 1 string | | |
| Anchors - 2 danforth | 134 | 134 |
| High Flyer Flags - 2 | 110 | 110 |
| Buoy Ball - 2 | 14 | 14 |
| NB line on buoy line | 16 | 133 |
| NB line on anchor line | 12 | 42 |
| Headrope | 515 | 920 |
| Leadline | 721 | 1,288 |
| Webbing | 463 | 828 |
| Total | 1,985 | 3,469 |
| Annual gear replacement | 4,210 | 12,329 |

Total variable expenses for a Class II vessel were $14,400 (CV=0.37) per year. This includes the cost of fuel, ice, water, food, bait and oil. NEFSC observer data were used to develop this estimate which is based on a cost per days absent from port. These seven vessels were absent 119 (CV=0.22) days per year on average.

Fixed expenses include the replacement cost of lost gear, annual gear replacement such as the panel webbing, license and docking fees. We assume sink vessels greater than 40 feet in length incur expense of $4,062 (=$573+$3,489) for licenses, permits, mooring and docking fees similar to lobster vessels greater than 50 feet in length. Given a vessel losses one string of sink gillnet gear per year, the replacement cost is $3,469 and it costs $8,860 to replace the panel webbing annually for a total of $12,329 (Table 5.1.2.9). Annual fixed costs are therefore $16,391.[14] Finally, annual variable and fixed vessel expenses for a Class II sink gillnet vessel is $30,800 on average.

[14] This estimate is considered downwardly biased since it does not include interest and loan payments, insurance, property taxes or fixed costs for shore front property.

*Results of profit analysis*
The average Class I sink gillnet vessel fishing in DAM earned a profit of $73,950 per year without this regulation. Annual revenues were $162,200 minus $14,300 for variable and fixed vessels expenses, leaving a remaining revenue of $147,900. Labor and profits are 50 percent each of the remaining revenues. Therefore annual vessel profits are $73,950 (Table 5.1.2.10).

Table 5.1.2.10.
Break Even analysis of DAM Class I sink gillnet vessels (PA)

| Revenue and Groundfish Landings | | |
|---|---|---|
| | | Annual |
| Revenue | $ | 162,200 |
| Variable and Fixed Costs | $ | 14,300 |
| Remaining Revenues | $ | 147,900 |
| Labor | | 73,950 |
| Profits | | 73,950 |
| Profit % Reduction | LB | (-0.4%) |
| | UB | (-0.7%) |
| Landings | pounds | 113,100 |

If this regulation is imposed, profits will be reduced by less than 0.4 percent given a sink gillnet vessel converts to low risk entanglement gear. This assumes the vessel uses a 1/4" polyester rope as the 1,100 pound weak link. Alternatively, if a vessel chooses to use the new break-away float, a vessel's profits will be reduced by 0.7 percent. It appears that a sink gillnet vessel under 40 feet can convert to low risk entanglement gear, continue to fish and earn profits.

Class II sink gillnet vessels fishing in the DAM zone earned a profit of $128,650 per year without this regulation. Annual revenues were $256,500 minus $30,800 for variable and fixed vessels expenses, leaving a remaining revenue of $257,300. Labor and profits are 50 percent each of the remaining revenues. Therefore, annual vessel profits are $128,650 (Table 5.1.2.11).

Table 5.1.2.11.
Break Even analysis of DAM Class II sink gillnet vessels (PA)

| Revenue and Groundfish Landings | | |
|---|---|---|
| | | Annual |
| Revenue | $ | 288,100 |
| Variable and Fixed Costs | $ | 30,800 |
| Remaining Revenues | $ | 257,300 |
| Labor | | 128,650 |
| Profits | | 128,650 |
| Profit % Reduction | LB | (-1.2%) |
| | UB | (-1.9%) |
| Landings | pounds | 256,500 |

If this regulation is imposed, profits will be reduced by less than 1.2 percent given a sink gillnet vessel converts to low entanglement risk gear. This assumes the vessel uses a 1/4" polyester rope as the 1,100 pound weak link. Alternatively, if a vessel chooses to use the new break-away float, a vessel's profits will be reduced by 1.9 percent. It appears that a Class II sink gillnet vessel can convert to low entanglement risk gear, continue to fish, and earn profits.

5.1.2.3 Summary of PA

Three potential scenarios considered as to how the fishing industry may react to this preferred alternative include: 1) convert to low risk entanglement gear and continue fishing in DAM; 2) do not convert to low risk entanglement gear and choose not to fish during this time period; or 3) do not convert to low risk entanglement gear, fish outside of the DAM area until it reopens and then move the gear back inside DAM. Each scenario will be discussed in this summary section.

Scenario 1: Vessels convert to low entanglement risk gear. Vessels fishing both lobster and sink gillnet gear have been grouped by size classes. The annual cost of converting to low entanglement risk gear ranges between a low of $295 for a Class I sink gillnet vessel in DAM to a high of $2,833 for a Class I or Class II lobster vessel (Table 5.1.2.12). In general, we assume vessels fishing lobster gear will take out a 3 year term loan at 8.5 percent to pay for the cost of converting their gear.

Under this scenario, Class I and Class II lobster vessels in the DAM zone can incur the cost of converting their gear, continue to fish, and earn a profit. Annual profits are reduced by a maximum of 9 percent for a Class I lobster vessel and 2 percent for a Class II lobster vessel under the proposed action (Table 5.1.2.12).

Table 5.1.2.12
Summary of PA vessels, annual revenues, variable and fixed expenses and profits per vessels with out this regulation, annual gear payments and reduction of profits due this regulation (ie. gear conversion costs) per vessel by fleet and vessel length class.

| | DAM | | | |
|---|---|---|---|---|
| | Lobster | | Sink Gillnet | |
| | Class I | Class II | Class I | Class II |
| Vessel Length in Feet | < 35 | < 50 | < 40 | > 40 |
| Number of Vessels | 13 | 16 | 4 | 12 |
| Per Vessel Annual Revenues | 59,700 | 152,600 | 162,200 | 256,500 |
| Variable and Fixed Expenses | 28,400 | 35,100 | 14,300 | 30,800 |
| Profits w/out PA | 31,300 | 117,500 | 73,950 | 128,650 |
| Annual Gear Loan Payment | | | | |
| LB | 944 | 944 | 295 | 1,547 |
| UB | 2,833 | 2,833 | 514 | 2,420 |
| Annual Profits Reduction | | | | |
| LB | 0.03 | 0.01 | 0.004 | 0.012 |
| UB | 0.09 | 0.02 | 0.007 | 0.019 |

Class I and Class II vessels fishing sink gillnet gear in the DAM closure should be able to incur the cost of converting to low entanglement risk gear, continue to fish and earn profits. If vessels choose the 1/4" polyester rope, then profits for Class I and Class II sink gillnet vessels were reduced by 0.4 percent (LB) and 1.2 percent (LB), respectively. Profits for a Class I and Class II sink gillnet vessels were reduced by 0.7 percent (UB) and 1.9 percent (UB), respectively, if they choose to use the break-away float versus a 1/4" polyester rope as a 1,100 pound weak link (Table 5.1.2.12).

Finally, the total lower and upper bound industry gear conversion costs for 45 vessels in the lobster and sink gillnet fleet are $47.1K and $113.3K, respectively (Table 5.1.2.13). This estimate includes the annual loan payment a lobster and sink gillnet vessel will pay to convert to low risk entanglement gear.

Table 5.1.2.13
Summary of PA vessels, annual loan payments, industry cost of converting to low risk entanglement gear and forgone revenues by fleet and vessel length class

| | DAM | | | | Grand Total |
|---|---|---|---|---|---|
| | Lobster | | Sink Gillnet | | |
| | Class 1 | Class II | Class I | Class II | |
| Vessel Length (Feet) | < 35 | 35<L< 50 | < 40 | > 40 | |
| Number of Vessels | 13 | 16 | 4 | 12 | 45 |
| Annual Loan Payment | | | | | |
| LB | 944 | 944 | 295 | 1,547 | |
| UB | 2,833 | 2,833 | 514 | 2,420 | |
| Industry Total | | | | | |
| LB | 12,272 | 15,104 | 1,180 | 18,564 | 47,120 |
| UB | 36,829 | 45,328 | 2,056 | 29,040 | 113,253 |

The total lower and upper bound industry costs for the lobster fleet are $27.4K (=$12,272 + $15,104) and $82.2K (=$36,829 + $45,328), respectively. Total lower and upper bound industry costs for the sink gillnet fleet are $19.7K (=$1,180+$18,564) and $31.1K (=$2,056+$29,040), respectively.

Scenario 2: As a second scenario, a vessel may choose not to convert to low entanglement risk gear or fish. Vessels incur the cost of removing and resetting their gear in the water, plus forgone revenues. Based on the estimated profit reductions under scenario 1 of the PA, all vessels are likely to convert to low entanglement risk gear. These vessels must weigh their loss in profits against the risk they take of losing fishing bottom to another vessel. That is, once gear is removed from an area, it is open for any other vessel to fish it given they comply with this regulation.

Scenario 3: In the third scenario, a vessel may choose not to convert to low entanglement risk gear and fish outside of a DAM zone. In this case, the vessel's revenues would be influenced by the catch rates inside and outside of the closed area. If the catch rates are lower outside and there is bottom available to fish, vessel profits would be reduced. In addition, the vessel would incur the extra labor and fuel cost associated with moving and resetting their gear inside and outside of a DAM zone, plus they take the risk of losing their fishing territory in a DAM zone. Based on the estimated profit reductions under scenario 1 of the PA, all vessels are likely to convert to low risk entanglement gear.

Conclusion:
Class I and Class II lobster vessels in the DAM zone are likely to choose scenario 1 since annual profits are reduced by a maximum of 9 percent. All sink gillnet vessels are likely to choose scenario 1 since annual profits are reduced by a maximum of 1.9 percent.

### 5.1.3 Social Impacts

Using the 2000 data to conduct a retrospective analysis, it appears that application of DAM in 2000 would have affected approximately 210 lobster vessels and 42 gillnet vessels in 6 areas that were affected for a total of 193 days. This analysis assumed that fishing effort in DAM Area 1 is uniformly distributed and is representative of fishing effort in the other 5 DAM areas. It is also important to note that these gear restrictions may be in addition to other closures and restrictions imposed under the Magnuson-Stevens Act. Restricting fishing in these areas may result in reduced employment if the result is that the vessels do not fish on the days that implementation of DAM has closed an area. Alternatively, a DAM zone in one area may shift fishing effort outside that area into adjacent areas. This effort shift may require more time away from family, friends and community as fishermen may need to travel further to reach fishing grounds not restricted. However, effort may be shifted inshore, perhaps closer to family, friends and community.

Social benefits may be realized if these gear modifications for DAM zones are effective at reducing the risk of entanglement to right whales, other marine mammals, and sea turtles. If this reduced risk increases the potential for recovery, then society will benefit by preventing a loss of a species and preserving biodiversity. While these DAM gear modifications place time and area restrictions on fishing practices, they do not prohibit fishing all together. Social benefits are realized from the application of management practices that demonstrate that fishing practices and marine mammals can co-exist.

Additionally, if NMFS implements a DAM zone with SAM gear modifications, fishermen who fish with SAM or similarly modified gear would be able to comply quicker to protect right whales then if they had to completely remove gear from the area. For example, fishermen that modify their gear to fish within the SAM area would be able to fish within a DAM zone if NMFS decided to implement gear modifications in the zone.

## 5.2 NO ACTION

The No Action alternative would leave in place the existing regulations promulgated under the ALWTRP, but would not identify gear modifications that would allow lobster trap and anchored gillnet fishing inside a DAM zone. Under the DAM program (67 FR 1133, January 9, 2002), once a DAM zone is triggered and defined, NMFS may: 1) require the removal of all lobster trap and anchored gillnet gear from the DAM zone within two days of publication in the Federal Register; 2) issue an alert to fishermen requesting the voluntary removal of all lobster trap and anchored gillnet gear for a 15-day period; or 3)allow fishing with lobster trap and anchored gillnet gear determined to sufficiently reduce the risk of entanglement to right whales. However, the current regulations do not identify fishing gear determined to sufficiently reduce the risk of entanglement to right whales under the DAM program. Therefore, the only management options available to NMFS under the current DAM program are either a complete closure or request for voluntary removal of lobster trap and anchored gillnet gear inside the DAM zone. So, if the No Action alternative is adopted, then the regulations would lack identified gear modifications that sufficiently reduce the risk of entanglement to right whales within DAM zones.

### 5.2.1 Biological Impacts

The DAM program, as it is currently implemented, only provides NMFS with the option of either closing a DAM zone to all lobster trap and anchored gillnet fishing for a 15-day period or issuing an alert to fishermen requesting the voluntary removal of all lobster trap and gillnet fishing gear for a 15-day period. NMFS reserved the authority to require gear modifications within DAM zones, but specified that such modifications would have to be identified in a future rulemaking, once NMFS determined which modifications would sufficiently reduce the risk of entanglement to right whales. The No Action alternative would prevent NMFS from identifying acceptable gear modifications, but would not have direct biological impacts. However, the No Action alternative may have indirect negative biological impacts of the lack of an option to fish modified gear in a DAM zone results in low compliance with regulations closing a DAM zone to protect whales.

The success of DAM depends to a great extent on whether NMFS is able to exercise the full range of management options that the agency intended to be available under the DAM program. The identification of gear modifications that sufficiently reduce the risk of entanglement to right whales is, therefore, important to achieving the DAM program NMFS envisioned during the development of this RPA component. Once gear modifications are identified and determined to reduce the risk of entanglement to right whales, NMFS will endeavor to educate the regulated community of those gear modifications and achieve compliance with any restrictions that are implemented. Completion of rulemaking to identify such gear modifications as an alternative management measure to implementing a DAM closure would have positive biological consequences for right whales if public participation results in greater compliance by fishermen with DAM restrictions. Such positive consequences may be foregone by choosing the No Action alternative.

### 5.2.2 Economic Impacts

A complete closure to lobster and sink gillnet gear exists when a DAM is implemented, under status quo. In the worst case scenario, a vessel would move their gear out of the DAM zone and choose not to fish and therefore incur revenue losses plus the cost of moving their gear. Based on analysis of sightings data from 2000, Clapham and Pace (2000) predicted DAM zones would have been induced 6 times. Four of these six DAM zones are subsumed under Seasonal Area Management (SAM) and one DAM zone is in Canadian waters. Economic impacts are assessed for one DAM zone under this proposed action. Specifically, the one DAM zone occurs from June 20 to July 6, 2000 (Clapham and Pace, 2000).

If a lobster vessel chose not to fish outside the closed DAM zone, annual revenues would be reduced by 5 percent if these 29 vessels chose not to fish from June 20 to July 6, 2002. Annual forgone revenues would be reduced by approximately 9 percent for a sink gillnet vessel if they also chose not to fish outside the closed DAM zone from June 20 to July 6, 2002.

Under status quo, total forgone industry revenues for the lobster and sink gillnet fleet under the worst case scenario are estimated at $529.5K. Industry revenues for Class I and II vessels in the lobster fleet would be reduced by $39.2K (=13 Class I vessels *$3.0K forgone revenues) and $115.6K (=16 Class II vessels*$7.2K forgone revenues), respectively. Industry revenues for Class I and II vessels in the sink gillnet fleet would be reduced by $54.1K (=4 Class I vessels *$13.5K forgone revenues) and $320.6K (=12 Class II vessels*$26.7K forgone revenues), respectively.

### 5.2.3 Social Impacts

Under the No Action alternative, gear modifications are not identified and, therefore, impacts to employment, family and community are elevated by requiring either complete closures or requesting the voluntary removal of all lobster trap and anchored gillnet gear from a DAM zone.

Using the 2000 data to conduct a retrospective analysis, it appears that application of DAM in 2000 would have affected approximately 210 lobster vessels and 42 gillnet vessels in 6 areas that were affected for a total of 193 days. This analysis assumed that fishing effort in DAM Area 1 is uniformly distributed and is representative of fishing effort in the other 5 DAM areas. It is also important to note that these closures may be in addition to other closures and restrictions imposed under the Magnuson-Stevens Act. Prohibiting fishing in these area may result in reduced employment if the result is that the vessels do not fish on the days when a DAM zone has closed an area. Alternatively, a DAM closure in one area may shift fishing effort outside that area into adjacent areas. This effort shift may require more time away from family, friends and community as fishermen may need to travel further to reach fishing grounds not restricted. However, effort may be shifted inshore, perhaps closer to family, friends and community.

Social benefits may be realized if these DAM closures are effective at reducing the risk of entanglement to right whales, other marine mammals and sea turtles. If this reduced risk increases the potential for recovery, then society will benefit by preventing a loss of a species and preserving biodiversity. The extinction of the right whale would be a loss to society, which has placed a value on the protection of all species for their intrinsic value as well as for their contribution to biodiversity. While these DAM closures place time and area restrictions on fishing practices, they do not prohibit fishing all together in areas outside DAM zones. Social benefits are realized from the application of management practices that demonstrate that fishing practices and marine mammals can co-exist.

## 5.3 USE OF SEASONAL AREA MANAGEMENT (SAM) GEAR WITH A SECOND END LINE AND FLOATING LINE ON THE BOTTOM THIRD OF EACH END LINE

This alternative would identify gear modifications that NMFS may allow within a DAM zone. The modifications described in this section are in addition to those described in section 3.1. These modifications remove the requirement identified in the proposed action that lobster trap and anchored gillnet gear must be set with a single end line, thus allowing fishermen to use two end lines. In addition, under this alternative, SAM gear would be modified to allow the use of floating line on the bottom third of each of the two end lines. This modification would require fishermen to use sinking or neutrally buoyant line on the upper two-thirds of each end line instead of throughout the entire end line as required under the proposed action.

### 5.3.1 Biological Impacts

This alternative considers the option of replacing the requirement that all buoy lines be made entirely of either sinking or neutrally buoyant line with regulations that allow fishermen to use floating line on the bottom third of the buoy line. Allowing a short section of floating line on the bottom portion of the buoy line would raise the line above the traps, thereby preventing the line from "wrapping" around the trap (and pulling the buoy below the surface) with each change in tide. NMFS has received reports that fishermen were planning on using "toggle buoys" or small gillnet floats to raise the bottom one-third of the end line off the bottom to prevent the line from wrapping around the trap. The use of a toggle or float has the same effect as adding floating line to the bottom one-third of the end line, however, assuming that the toggle or float is not installed with a weak link, such devices on the line may pose a threat to a whale that becomes entangled in the gear since the toggle or float may prevent the end line from passing completely through the baleen in the whale's mouth. If allowing the use of floating line on the bottom one-third of the end line discourages fishermen from using a toggle or float, there may be some biological benefit to whales from such a provision. However, allowing floating line on the bottom one-third of the end line could create an entanglement risk to right whales if it forms an arch or loop of line in the water column. Although NMFS has video footage documenting that no loop in the water column is created because of currents and wave action on the surface system when the bottom one-third of the end line is composed of floating line, additional analysis and/or video footage is needed to indicate that allowing floating line on the bottom third of the buoy line does not increase the amount of line in the water column. Therefore, any potential cost of creating an entanglement risk would have to be weighed against any benefit realized from discouraging the use of other means to prevent the end line from wrapping around the trap.

This alternative would require lobster trap and anchored gillnet fishermen to use gear with SAM gear modifications in a DAM zone, except fishermen would be allowed to retain a second end line on each end of the lobster trap or gillnet trawl. Requiring lobster trap and anchored gillnet fishermen to mark both ends of their trawls with buoy lines would reduce gear conflicts, gear losses, and the proliferation of "ghost gear." Under this alternative, the use of SAM gear modifications, such as weak links and neutrally buoyant or sinking ground lines and end lines, would have entanglement risk reduction benefits. However, vertical line between the gear and the surface system is a source of entanglement. Therefore, under this alternative, the retention of a second end line increases the risk of entanglement by 50 percent.

### 5.3.2 Economic Impacts

Under the non-preferred alternative 1 (NPA 1) plan, vessels fishing lobster or sink gillnet gear must modify their gear to continue fishing in the DAM area. The difference between the PA and the NPA 1 plan for the lobster and sink gillnet fishery is the NPA 1 plan allows: 1) 2 buoy lines per lobster trawl and string of sink gillnet gear; and 2) the buoy line can be composed of 2/3 neutrally buoyant or sinking line and 1/3 poly (floating) rope. Several potential scenarios exist as to how the fishing industry may adapt to this proposed action. The scenarios include: 1) convert gear and continue fishing in DAM; 2) choose not to fish or convert gear; or 3) fish outside of the DAM area, do not convert gear, and move gear back into DAM when it reopens.

The economic analysis of the preferred alternative is divided into three sections. Sections 5.3.2.1 and 5.3.2.2 investigate the consequences of scenario 1 for the lobster and sink gillnet fleet, respectively. The results of the first two sections under scenario 1 are then summarized in Section 5.3.2.3. This summary section then ends with a discussion of scenario 2 and 3 as identified above.

#### 5.3.2.1 Lobster Fleet

In this section we present the economic impacts of a DAM zone from June 20 to July 6 on the lobster fleet. To continue fishing in these areas a vessel must convert its gear. We start by presenting the cost of converting to low risk entanglement gear. The economic impact of the DAM zone on the lobster fleet are evaluated next. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable and fixed vessel expenses and we end with results of a break even analysis results. However, the only difference between the PA and NPA 1 plan is the gear conversion costs.

<u>Cost to convert gear</u>
Under the NPA 1 plan, the use of 2 buoy lines per set of gear are allowed, the material composition of the buoy line changed, plus an extra weak line is required. First, the change in material costs will be presented followed by the change in cost for 2 buoy lines, followed by the cost of additional weak links. These changes will then be incorporated into a final gear conversion cost. We then present the annual loan payments for these gear conversion costs based on a 3 year term.

*Material cost of buoy lines*
Material cost per buoy line (MC(BL)) is the product of the depth of the water (DOW), slack for tides (Slack=1.5), and the dollar price per unit ($/unit). The cost of 3/8" neutrally buoyant line is $0.06 per foot and the poly rope is $0.03 per foot. Under the NPA 1 plan, 2/3 of the buoy line can be neutrally buoyant (NB) and 1/3 poly rope (PR). Labor cost of the buoy lines is the same as proposed under the PA. In equation form we have:

$$MC(BL) = DOW * Slack * [(2/3) * \$/\ NB\ unit\ +\ (1/3) * \$/PR\ unit)]$$

Under the PA, the material cost for one 3/8" buoy line made of 100 percent neutrally buoyant is $15.93 versus $13.27 for a buoy line composed of 2/3 neutrally buoyant and 1/3 poly rope.

The lower and upper bound material costs of two buoy lines under the NPA 1 plan for a Class I and Class II lobster vessel are $469.93($469.93 = 17.7 trawls*MC(BL)*2) and $1,415.11 ($1,415.11=53.3 trawls*MC(BL)*2), respectively. Under the PA, the lower and upper bound labor was $22 and $66 for one buoy line and is therefore $44 and $132, for 2 buoy lines (Table 5.1.2.2). Therefore, the total lower and upper bound costs of two buoy lines under the NPA 1 plan for Class

I and Class II lobster vessels are $513.93 and $1,547.11, respectively.[15]

*Material and labor cost of weak links*
Each buoy line for a Class I and Class II lobster vessel must have a weak link with a breaking strength of 1,500 pounds on the high flyer and the buoy ball. Under the PA, the lower and upper bound material and labor cost per vessel per buoy line was $128 and $387, respectively (Table 5.1.2.2). Therefore, the cost of weak links (WL) for 2 buoy lines are $256 and $774, respectively.

*Total Material and labor cost of converting gear*
The total lower and upper bound costs of converting gear are $2,831 (=$514(BL) + $2,061(NB on GL) + $256(WL)) and $8,527 (=$1,547(BL) + $6,206(NB on GL) + $774(WL)), respectively. For details of neutrally buoyant line on the ground line (NB on GL) see Table 5.1.2.2.

*3 Year Loan*
We assume a vessel will take a 3 year business loan to pay for the up-front material and labor costs of converting its gear.[16] Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here. For a Class I or Class II lobster vessel fishing in the Nearshore Lobster Waters, the lower bound gear conversion cost is $2,831, and annual payments are $1,072 with a total loan payment of $3,216. With the upper bound cost of $8,527, annual payments are $3,230 with a total loan payment of $9,690.

DAM
*Estimate of the number of vessels*
The number of vessels are the same as those presented under the PA. We assume the upper bound estimate is 29 lobster vessels of which 13 vessels are Class I lobster vessels and 16 are Class II lobster vessels. For details see Section 5.1.2.1.

[15] The total lower and upper bound cost of one buoy lines under the PA plan is $304 and $915, respectively (Table 5.1.2.2).

[16] The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, *pers. comm.*). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

*Revenues and landings*
Revenues and landings are the same as those presented under the PA.

*Variable and Fixed Vessel Expenses*
Variable and Fixed Vessel Expenses are the same as those presented under the PA.

*Results of Break Even Analysis*
The break even analysis results are the same as those presented under the PA with no regulation. The difference in the lower bound (and upper bound) gear conversion costs between the PA and NPA 1 plan is $128 ($397 UB) for a Class I and Class II vessel. Given this slight difference in cost for the lobster fishery, the results will be reported with the sink gillnet fishery in the summary section (See Section 5.3.2.3).

#### 5.3.2.2 Sink Gillnet Fleet

In this section we present the economic impacts of a DAM zone from June 20 to July 6 on the sink gillnet fleet. To continue fishing in these areas a vessel must convert its gear. We start by presenting the cost of converting gear. The economic impact of the DAM zone on the sink gillnet fleet are evaluated next. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable and fixed vessel expenses and we end with results of a break even analysis results. However, the only difference between the PA and NPA 1 plan is the gear conversion cost.

<u>Cost to convert gear</u>
Under the NPA 1 plan, the use of 2 buoy line per set of gear are allowed, the material composition of the buoy line changed, plus an extra weak link is required. First, the change in material costs will be presented followed by the change in cost for 2 buoy lines, followed by the cost of additional weak links. These changes will then be incorporated into a final gear conversion cost. We then present the annual loan payments for these gear conversion costs based on a 3 year term.

*Material cost of buoy lines*
Material cost per buoy line (MC(BL)) is the product of the depth of the water (DOW), slack for tides (Slack=1.5), and the dollar price per unit ($/unit). The cost of 3/8" neutrally buoyant line is $0.06 per foot and the poly rope is $0.03 per foot. The cost of 5/8" neutrally buoyant line is $0.211 per foot and the poly rope is $0.10 per foot. Under the NPA 1 plan, 2/3 of the buoy line can be neutrally buoyant (NB) and 1/3 poly rope (PR). Labor costs of the buoy lines are the same as those presented under the PA. In equation form we have:

$$\mathrm{MC(BL)} = \mathrm{DOW} * \mathrm{Slack} * [(2/3) * \$/\ \mathrm{NB\ unit} + (1/3) * \$/\mathrm{PR\ unit})]$$

A Class I sink gillnet vessel fishing nearshore used 3/8" line and a Class II sink gillnet vessel typically uses a 5/8" line. Under the PA, the material cost for one 3/8" and 5/8" buoy line made of 100 percent neutrally buoyant is $15.93 versus $132.61, respectively. The material cost for a 3/8" and 5/8" buoy line composed of 2/3 neutrally buoyant and 1/3 poly rope is $13.28 and $109.36, respectively.

The cost of two buoy lines under the NPA 1 plan for a Class I and Class II sink vessel are $127.44($127.44 = 4.8 strings*MC(BL)*2) and $2,403.28 ($2,403.28=10.7 strings*MC(BL)*2), respectively. Under the PA, the Class I and II labor cost was $5.97 and $31.50 for one buoy line and is therefore $11.94 and $63, for 2 buoy lines (Table 5.1.2.8). Therefore, the total costs of two buoy lines under the NPA 1 plan for Class I and Class II sink gillnet vessel are $139.38 and $2,466.28, respectively.[17]

*Material and labor cost of weak links*
Each buoy line for a Class I and Class II sink gillnet vessel must have a weak link attached near the high flyer and the buoy ball. Under the PA, the material and labor cost of a weak link per vessel per buoy line was roughly $11 for a Class I vessel and $25 for a Class II vessel (Table 5.1.2.8). Therefore, the cost of weak links (WL) for 2 buoy lines are $22 and $50 for a Class I and Class II sink gillnet vessel, respectively.

*Total Material and labor cost of converting to low risk entanglement gear*
For Class I sink gillnet vessels, the cost of installing 1,100 pound weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link is $489, $139, $196, and $22, totaling $846.[18] Similarly for a Class II vessel it costs $1,927, $2,403, $681, and $50 to install 1,100 pound weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link (see footnote 18), respectively, totaling $5,063. The largest cost component for both vessel types is the 1,100 pound weak links. If the

[17] The total cost per vessel of one buoy line under the PA plan, for a Class I and II sink gillnet vessel is $82 and $1,450.56, respectively.

[18] During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively. However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas. Therefore, the analysis of costs incurred is likely to be overestimated.

break-away floats are available, the total cost per vessel for a Class I vessel and Class II vessel is $1,426 and $7,367, respectively (Table 5.1.2.10). For details of neutrally buoyant line on the anchor line (NB on AL) or weak links, see Table 5.1.2.8.

*3 Year Loan*
We assume a vessel will take a 3 year business loan to pay for the up-front material and labor costs of converting its gear.[19] Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here.

For a Class I sink gillnet vessel, the lower bound gear conversion cost is $846, and annual payments are $321 with a total loan payment of $963. With the upper bound cost of $1,426, annual payments are $540 with a total loan payment of $1,620.

For a Class II sink gillnet vessel, the lower bound gear conversion cost is $5,063, and annual payments are $1,918 with a total loan payment of $5,754. With the upper bound cost of $7,367, annual payments are $2,790 with a total loan payment of $8,370.

<u>DAM</u>
*Estimate of the number of vessels*
The number of sink gillnet vessels are the same as those presented under the PA. There are 16 sink gillnet vessels fishing in the DAM zone, of which 4 vessels are Class I and 12 are Class II vessels. For details see Section 5.1.2.2.

*Revenues and landings*
Revenues and landings are the same as those presented under the PA.

*Variable and Fixed Vessel Expenses*
Variable and Fixed Vessel Expenses are the same as those presented under the PA.

*Results of Profit Analysis*
The profit analysis results are the same as those presented under the PA with no regulation. The upper bounds gear conversion cost of a Class I sink gillnet vessel(and Class II) differ by $29 ($978 for Class II) between the PA and NPA 1 plan. Given this slight difference

[19] The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, *pers. comm.*). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

in cost for the sink gillnet fishery, the results will be reported with the lobster fishery in the summary section (See Section 5.3.2.3).

#### 5.3.2.3 Summary of NPA 1

Three potential scenarios considered as to how the fishing industry may react to this non-preferred alternative include: 1) convert their gear and continue fishing in DAM; 2) do not convert their gear and choose not to fish during this time period; or 3) do not convert gear, fish outside of the DAM area until it reopens and then move the gear back inside DAM. Each scenario will be discussed in this summary section.

Scenario 1: Vessels convert their gear
Vessels fishing both lobster and sink gillnet gear have been grouped by size classes. The annual cost of converting gear ranges between a low of $321 for a Class I sink gillnet vessel to a high of $3,230 for a Class I or Class II lobster vessel (Table 5.3.2.1). In general, we assume vessels fishing lobster gear will take out a 3 year term loan at 8.5 percent to pay for the cost of converting their gear.

Table 5.3.2.1
Summary of NPA 1 vessels, annual revenues, variable and fixed expenses and profits per vessels with out this regulation, annual gear payments and reduction of profits due this regulation (ie. gear conversion costs) per vessel by fleet and vessel length class.

| | DAM | | | |
|---|---|---|---|---|
| | Lobster | | Sink Gillnet | |
| | Class I | Class II | Class I | Class II |
| Vessel Length in Feet | < 35 | < 50 | < 40 | > 40 |
| Number of Vessels | 13 | 16 | 4 | 12 |
| Per Vessel<br>Annual Revenues | 59,700 | 152,600 | 162,200 | 256,500 |
| Variable and Fixed Expenses | 28,400 | 35,100 | 14,300 | 30,800 |
| Profits w/out PA | 31,300 | 117,500 | 73,950 | 128,650 |
| Annual Gear Loan Payment | | | | |
| LB | 1,072 | 1,072 | 321 | 1,918 |
| UB | 3,230 | 3,230 | 540 | 2,790 |
| Annual Profits Reduction | | | | |
| LB | 0.034 | 0.009 | 0.004 | 0.015 |
| UB | 0.103 | 0.027 | 0.007 | 0.022 |

Under this scenario, Class I and Class II lobster vessels in the DAM zone from June 20 to July 6 can absorb the cost of converting their gear, continue to fish and earn a profit. Their annual profits are reduced by a minimum of 0.9 percent and a maximum of 10.3 percent under this alternative (Table 5.3.2.1).

Class I and Class II vessels fishing sink gillnet gear in the DAM zone should also be able to absorb the cost of converting their gear, continue to fish and earn profits. Their profits were reduced by a minimum of 0.4 percent and a maximum of 2.2 percent (Table 5.3.2.1).

Table 5.3.2.2
Summary of NPA 1 vessels, annual loan payments, industry cost of converting gear and forgone revenues by fleet and vessel length class.

| | DAM | | | | Grand Total |
|---|---|---|---|---|---|
| | Lobster | | Sink Gillnet | | |
| | Class 1 | Class II | Class I | Class II | |
| Vessel Length (Feet) | < 35 | 35<L< 50 | < 40 | > 40 | |
| Number of Vessels | 13 | 16 | 4 | 16 | 45 |
| Annual Loan Payment | | | | | |
| LB | 1,072 | 1,072 | 321 | 1,918 | |
| UB | 3,230 | 3,230 | 540 | 2,790 | |
| Industry Total | | | | | |
| LB | 13,936 | 17,152 | 1,284 | 23,016 | 55,388 |
| UB | 41,990 | 51,680 | 2,160 | 33,480 | 129,310 |

Finally, the total lower and upper bound industry gear conversion costs for 45 vessels in the lobster and sink gillnet fleet are $55.4K and $129.3K, respectively (Table 5.3.2.2). This estimate includes the annual loan payment a lobster and sink gillnet vessel will pay to convert its gear.

The total lower and upper bound industry costs for the lobster fleet are $31.1K and $93.7K, respectively. Total lower and upper bound industry costs for the sink gillnet fleet are $24.3K and $35.6K, respectively.

Scenario 2: As a second scenario, a vessel may choose not to convert its gear or fish. Vessels incur the cost of removing and resetting their gear in the water, plus forgone revenues. These vessels must weigh their loss in profits against the risk they take of losing fishing bottom to another vessel. That is, once gear is removed from an area, it open for any other vessel to fish it given they comply with this regulation. Based on the estimated profit reductions of scenario 1, all vessels are likely to convert their gear.

Scenario 3: In the third scenario, a vessel may choose not to convert its gear and fish outside of the DAM zone from June 20 to July 6. In this case, the vessels revenue's would be influenced by the catch rates inside and outside of the DAM area. If the catch rates are lower outside and there is bottom available to fish, vessel profits would be reduced. In addition, the vessel would incur the extra labor and fuel cost associated with moving and resetting their gear inside and out of DAM. They also take the risk of losing their fishing territory in DAM to another vessel. Based on the estimated profit reductions of scenario 1, all vessels are likely to convert their gear.

Conclusion: All sink gillnet vessels are likely to choose scenario 1 since annual profits are reduced by a maximum of 2.2 percent. Class I and Class II lobster vessels are also likely to choose scenario 1 since profits are reduced by a maximum of 10.3 percent.

### 5.3.3 Social Impacts

Because the DAM gear modifications identified under this alternative result in the retention of a double end line, their adoption does not have significant effects within the fishing community on employment and other aspects of life. However, the recommendation to allow floating line on the bottom third of each end line may affect those segments of the fishing community that fish in areas outside SAM because the existing ALWTRP regulations for those areas do not already require this type of gear modification. Anchored gillnet fishermen in areas outside SAM would be similarly affected. Once a DAM zone is triggered and established, the restrictions implemented would be effective for 15 days. During that 15 day restricted period, those vessels that do not or can not comply with the identified gear modifications could either not fish at all or fish in another unrestricted location. This may result in short term unemployment or have some impact on family and community if, during those 15 days, fishing vessels have to travel further from home to access open fishing grounds. However, effort may be shifted inshore, perhaps closer to family, friends and community.

With the passage of the Endangered Species Act, society has indicated that it wishes to prevent the extinction of species. This alternative would have negative social impacts if it jeopardizes the achievement of that goal.

## 5.4 USE OF SAM GEAR WITH SECOND END LINE

This alternative, non-preferred alternative 2 (NPA 2), would implement the same gear modifications as described in Section 3.1 except that fishermen would be allowed to use two end lines instead of one. This alternative is different from NPA 1, because it would not allow the bottom one-third of the end line to be composed of floating line. Under this alternative, end lines and ground lines would have to be composed entirely of neutrally buoyant or sinking line.

### 5.4.1 Biological Impacts

Floating line has been identified as the source of North Atlantic right whale entanglement because the line is designed to float in the water column to avoid contact with the bottom of the ocean during lower tides. The slack in the floating line is identified as a source of North Atlantic right whale entanglement. NMFS determined that typical offshore lobster pot gear is configured with approximately 7,000 ft (2,134 m)of floating line. Video recording of typical lobster gear with floating groundline between traps revealed that the line forms large loops in the water column between traps. Similar video recording of neutrally buoyant line between traps revealed that it did not have the same vertical profile as floating line; rather, it was located on or near the bottom and was not presented to North Atlantic right whales as an entanglement risk. To minimize interactions between fishing gear and North Atlantic right whales, the proposed rule for DAM gear modifications would prohibit floating line for all lobster pot and gillnet gear within the DAM zones during the restricted period. By eliminating floating line and requiring sinking or neutrally buoyant line, approximately 85 percent of the line within the water column would be eliminated.

This alternative would require lobster trap and anchored gillnet fishermen to use gear with SAM gear modifications in a DAM zone, except fishermen would be allowed to retain a second end line on each end of the lobster trap or gillnet trawl. Requiring lobster trap and anchored gillnet fishermen to mark both ends of their trawls with buoy lines would reduce gear conflicts, gear losses, and the proliferation of "ghost gear." Under this alternative, the use of SAM gear modifications, such as weak links and neutrally buoyant or sinking ground lines and end lines, would have entanglement risk reduction benefits. However, vertical line between the gear and the surface system is a source of entanglement. Therefore, under this alternative, the retention of a second end line increases the risk of entanglement by 50 percent.

### 5.4.2 Economic Impacts

Under the non-preferred alternative 2 (NPA 2) plan, vessels fishing lobster or sink gillnet gear must modify their gear to continue fishing in the DAM area. The difference between the PA and the NPA 2 plan for the lobster and sink gillnet fishery is the NPA 2 plan allows 2 buoy lines per lobster trawl and string of sink gillnet gear. Several potential scenarios exist as to how the fishing industry may adapt to this proposed action. The scenarios include: 1) convert their gear in accordance with the NPA 2 gear modifications and continue fishing in DAM; 2) choose not to fish or convert their gear; or 3) fish outside of the DAM area, do not convert their gear, and move gear back into DAM when it reopens.

The economic analysis of the non-preferred alternative is divided into three sections. Sections 5.4.2.1 and 5.4.2.2 investigate the consequences of scenario 1 for the lobster and sink gillnet fleet, respectively. The results of the first two sections under scenario 1 are then summarized in Section 5.4.2.3. This summary section then ends with a discussion of scenarios 2 and 3 as identified above.

5.4.2.1 Lobster Fleet

In this section we present the economic impacts of a DAM zone from June 20 to July 6 on the lobster fleet. To continue fishing in these areas, a vessel must convert to low risk entanglement gear. We start by presenting the cost of converting their gear. The economic impacts of the DAM zone on the lobster fleet are evaluated next. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable and fixed vessel expenses and we end with results of a break even analysis results. However, the only difference between the PA and NPA 2 plan is the gear conversion costs.

<u>Cost to convert gear</u>
Under the NPA 2 plan the use of 2 buoy line per set of gear are allowed, plus an extra weak link is required. The material composition of the buoy line under the NPA 2 plan is the same as the PA. First the cost of 2 buoy lines is presented, followed by the cost of additional weak links. These changes will then be incorporated into a final gear conversion cost. We then present the annual loan payments for these gear conversion costs based on a 3 year term.

*Material cost of buoy lines*
The lower and upper bound material costs of two buoy lines under the PA plan for a Class I and Class II lobster vessel are $608 and $1,830 (Table 5.1.2.2).[20]

*Material and labor cost of weak links*
Each buoy line for a Class I and Class II lobster vessel must have a weak link attached near the high flyer and the buoy ball. Under the PA, the lower and upper bound material and labor cost per vessel per buoy line was $128 and $387, respectively (Table 5.1.2.2). Therefore, the cost of weak links (WL) for 2 buoy lines are $256 and $774, respectively.

*Total Material and labor cost of converting gear*
The total lower and upper bound costs of converting gear are $2,921 (=$604(BL) + $2,061(NB on GL) + $256(WL)) and $8,810 (=$1,830(BL) + $6,206(NB on GL) + $774(WL)), respectively.
For details of neutrally buoyant line on the ground line (NB on GL) see Table 5.1.2.2.

*3 Year Loan*
We assume a vessel will take a 3 year business loan to pay for the up-

[20] The total lower and upper bound cost of one buoy lines under the PA 1 plan is $304 and $915, respectively.

front material and labor costs of converting its gear.[21] Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here. For a Class I or Class II lobster vessel, the lower bound gear conversion cost is $2,921, and annual payments are $1,107 with a total loan payment of $3,321. With the upper bound cost of $8,810, annual payments are $3,337 with a total loan payment of $10,011.

DAM

*Estimate of the number of vessels*
The number of vessels are the same as those presented under the PA. We assume the upper bound estimate is 29 lobster vessels of which 13 vessels are Class I lobster vessels and 16 are Class II lobster vessels. For details see Section 5.1.2.1.

*Revenues and landings*
Revenues and landings are the same as those presented under the PA.

*Variable and Fixed Vessel Expenses*
Variable and Fixed Vessel Expenses are the same as those presented under the PA.

*Results of Break Even Analysis*
The break even analysis results are the same as those presented under the PA with no regulation. The difference in the lower bound (and upper bound) gear conversion costs between the PA and NPA 2 plan is $428 ($1,302 UB) for a Class I and Class II vessel. Given this slight difference in cost for the lobster fishery, the results will be reported with the sink gillnet fishery in the summary section (See Section 5.4.2.3).

5.4.2.2 Sink Gillnet Fleet

In this section we present the economic impacts of a DAM zone from June 20 to July 6 on the sink gillnet fleet. To continue fishing in these areas, a vessel must convert its gear. We start by presenting the cost of converting gear. The economic impact of the DAM zone on the sink gillnet fleet are evaluated next. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable, and fixed vessel expenses and we end with results of

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[21] The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, *pers. comm.*). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

a break even analysis results. However, the only difference between the PA and NPA 2 plan is the gear conversion cost.

<u>Cost to convert gear</u>
Under the NPA 2 plan, the use of 2 buoy line per set of gear are allowed, plus an extra weak link is required. The material composition of the buoy line under the PA and NPA 2 plan are the same. First, the cost of 2 buoy lines are presented, followed by the cost of additional weak links. These changes will then be incorporated into a final gear conversion cost. We then present the annual loan payments for these gear conversion costs based on a 3 year term.

*Material cost of buoy lines*
The cost of two buoy lines under the NPA 2 plan for a Class I and Class II sink vessel are $164.92 and $2,900.92.[22]

*Material and labor cost of weak links*
Each buoy line for a Class I and Class II sink gillnet vessel must have a weak link attached near the high flyer and the buoy ball. Under the PA, the material and labor cost of a weak link per vessel per buoy line was roughly $11 for a Class I vessel and $25 for a Class II vessel (Table 5.1.2.8). Therefore, the cost of weak links (WL) for 2 buoy lines are $22 and $50 for a Class I and Class II sink gillnet vessel, respectively.

*Total Material and labor cost of converting gear*
For Class I sink gillnet vessels, the cost of installing 1,100 pound weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link is $489, $165, $196, and $22, totaling $872.[23] Similarly, for a Class II vessel it costs $1,927, $2,901, $681, and $50 to install 1,100 pound weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link (see footnote 23), respectively, totaling $5,559. If the break-away floats are available, the total cost per vessel for a Class I vessel and Class II vessel is $1,450 and $7,864, respectively. For details

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[22] The total cost per vessel of one buoy line under the PA plan, for a Class I and II sink gillnet vessel is $82 and $1,450.56, respectively.

[23] During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively. However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas. Therefore, the analysis of costs incurred is likely to be overestimated.

of neutrally buoyant line on the anchor line (NB on AL) or weak links, see Table 5.1.2.8.

*3 Year Loan*
We assume a vessel will take a 3 year business loan to pay for the up-front material and labor costs of converting its gear.[24] Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here.

For a Class I sink gillnet vessel, the lower bound gear conversion cost is $872, and annual payments are $330 with a total loan payment of $990. With the upper bound cost of $1,450, annual payments are $549 with a total loan payment of $1,647.

For a Class II sink gillnet vessel, the lower bound gear conversion cost is $5,559, and annual payments are $2,106 with a total loan payment of $6,318. With the upper bound cost of $7,864, annual payments are $2,979 with a total loan payment of $8,937.

<u>DAM</u>
*Estimate of the number of vessels*
The number of sink gillnet vessels are the same as those presented under the PA. There are 16 sink gillnet vessels fishing in the DAM zone, of which 4 vessels are Class I and 12 are Class II vessels. For details see Section 5.1.2.2.

*Revenues and landings*
Revenues and landings are the same as those presented under the PA.

*Variable and Fixed Vessel Expenses*
Variable and Fixed Vessel Expenses are the same as those presented under the PA.

*Results of Profit Analysis*
The profit analysis results are the same as those presented under the PA with no regulation. The upper bounds annual loan payment for the cost of converting gear for a Class I sink gillnet vessel(and Class II) differ by $35 ($559 for Class II) between the PA and NPA 2 plan. Given this slight difference in cost for the sink gillnet fishery, the

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[24] The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, *pers. comm.*). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

results will be reported with the lobster fishery in the summary section (See Section 5.4.2.3).

5.4.2.3 Summary of NPA 2

Three potential scenarios considered as to how the fishing industry may react to this non-preferred alternative include: 1) convert their gear and continue fishing in DAM; 2) do not convert their gear and choose not to fish during this time period; or 3) do not convert their gear, fish outside of the DAM area until it reopens, and then move the gear back inside DAM. Each scenario will be discussed in this summary section.

Scenario 1: Vessels convert their gear. Vessels fishing both lobster and sink gillnet gear have been grouped by size classes. The annual cost of converting gear ranges between a low of $330 for a Class I sink gillnet vessel to a high of $3,337 for a Class I or Class II lobster vessel. In general, we assume vessels fishing lobster gear will take out a 3 year term loan at 8.5 percent to pay for the cost of converting their gear.

Under this scenario, Class I and Class II lobster vessels in the DAM zone from June 20 to July 6 can absorb the cost of converting their gear, continue to fish, and earn a profit. Their annual profits are reduced by a minimum of 0.9 percent and a maximum of 10.7 percent under this alternative (Table 5.4.2.1).

Table 5.4.2.1
Summary of NPA 2 vessels, annual revenues, variable and fixed expenses and profits per vessels with out this regulation, annual gear payments and reduction of profits due this regulation (ie. gear conversion costs) per vessel by fleet and vessel length class.

| | DAM | | | |
|---|---|---|---|---|
| | Lobster | | Sink Gillnet | |
| | Class I | Class II | Class I | Class II |
| Vessel Length in Feet | < 35 | < 50 | < 40 | > 40 |
| Number of Vessels | 13 | 16 | 4 | 12 |
| Per Vessel | | | | |
| Annual Revenues | 59,700 | 152,600 | 162,200 | 256,500 |
| Variable and Fixed Expenses | 28,400 | 35,100 | 14,300 | 30,800 |
| Profits w/out PA | 31,300 | 117,500 | 73,950 | 128,650 |
| Annual Gear Loan Payment | | | | |
| LB | 1,107 | 1,107 | 330 | 2,106 |
| UB | 3,337 | 3,337 | 549 | 2,979 |
| Annual Profits Reduction | | | | |
| LB | 0.035 | 0.009 | 0.005 | 0.016 |
| UB | 0.107 | 0.028 | 0.007 | 0.023 |

Class I and Class II vessels fishing sink gillnet gear in the DAM zone should also be able to absorb the cost of converting their gear, continue to fish, and earn profits. Their profits were reduced by a minimum of 0.5 percent and a maximum of 2.3 percent (Table 5.4.2.1).

Finally, the total lower and upper bound industry gear conversion costs for 45 vessels in the lobster and sink gillnet fleet are $58.7K and $134.7K, respectively (Table 5.4.2.2). This estimate includes the annual loan payment a lobster and sink gillnet vessel will pay to convert its gear.

The total lower and upper bound industry costs for the lobster fleet are $32.1K and $96.8K, respectively (Table 5.4.2.2). Total lower and upper bound industry costs for the sink gillnet fleet are $26.7K and $37.9K, respectively.

Table 5.4.2.2
Summary of NPA 2 vessels, annual loan payments, industry cost of converting gear and forgone revenues by fleet and vessel length class

| | DAM | | | | Grand Total |
|---|---|---|---|---|---|
| | Lobster | | Sink Gillnet | | |
| | Class 1 | Class II | Class I | Class II | |
| Vessel Length (Feet) | < 35 | 35<L< 50 | < 40 | > 40 | |
| Number of Vessels | 13 | 16 | 4 | 12 | 45 |
| Annual Loan Payment | | | | | |
| LB | 1,107 | 1,107 | 330 | 2,106 | |
| UB | 3,337 | 3,337 | 549 | 2,979 | |
| Industry Total | | | | | |
| LB | 14,391 | 17,712 | 1,320 | 25,272 | 58,695 |
| UB | 43,381 | 53,392 | 2,196 | 35,748 | 134,717 |

Scenario 2: As a second scenario, a vessel may choose not to convert its gear or fish. Vessels incur the cost of removing and resetting their gear in the water, plus forgone revenues. These vessels must weigh their loss in profits against the risk they take of losing fishing bottom to another vessel. That is, once gear is removed from an area, it opens for any other vessel to fish it given they comply with this regulation. Based on the estimated profit reductions of scenario 1, all vessels are likely to convert their gear.

Scenario 3: In the third scenario, a vessel may choose not to convert its gear and fish outside of the DAM zone from June 20 to July 6. In this case, the vessel's revenues would be influenced by the catch rates inside and outside of the restricted area. If the catch rates are lower outside and there is bottom available to fish, vessel profits would be reduced. In addition, the vessel would incur the extra labor and fuel cost associated with moving and resetting their gear inside and out of a DAM zone. They also take the risk of losing their fishing territory in the DAM zone to another vessel. Based on the estimated profit reductions of scenario 1, all vessels are likely to convert their gear.

Conclusion: All sink gillnet vessels are likely to choose scenario 1 since annual profits are reduced by a maximum of 2.3 percent. Class I and Class II lobster vessels are likely to choose scenario 1 since profits are reduced by a maximum of 10.7 percent.

### 5.4.3 Social Impacts

The DAM gear modifications identified under this alternative result in the retention of a double end line, therefore, their adoption does not have significant effects within the fishing community on employment and other aspects of life. However, the changeover to end lines made entirely of neutrally buoyant or sinking line may affect those segments of the fishing community that fish in areas outside SAM because the existing ALWTRP regulations for those areas do not already require this type of gear modification. Anchored gillnet fishermen in the areas outside SAM would be similarly affected. Once a DAM zone is triggered and established, the restrictions implemented would be effective for 15 days. During that 15 day restricted period, those vessels that do not or can not comply with the identified gear modifications could either not fish at all or fish in another unrestricted location. This may result in short term unemployment or have some impact on family and community if, during those 15 days, fishing vessels have to travel further from home to access open fishing grounds. However, effort may be shifted inshore, perhaps closer to family, friends and community.

With the passage of the Endangered Species Act, society has indicated that it wishes to prevent the extinction of species. This alternative would have negative social impacts if it jeopardizes the achievement of that goal.

## 6.0 POTENTIAL CUMULATIVE EFFECTS

This section estimates the cumulative effects of several preferred alternative plans implemented with the intention of protecting right whales. Three types of plans exist. The first plan requires gear modifications (NMFS 1997; NMFS 2000; NMFS 2002). Dynamic Area Management (DAM) was the second plan. Under DAM, a sighting of 3 right whales at a density of 0.04 right whales per square nautical mile could trigger a closure to all lobster and sink gillnet gear. Seasonal Area Management (SAM) allows lobster trap and sink gillnet vessels to fish in two SAM areas if the vessels convert to low entanglement risk gear. Here we propose a modification to the earlier DAM EA. Specifically, vessels are allowed to fish in a DAM zone if the also convert to low entanglement risk gear. See Section 8.1 (*Right Whale Management*) for an explanation of the overall strategy of these plans.

The proposed DAM regulation would be put in place after the 2002 Gear, DAM and SAM regulations. The last regulation put in place was SAM. To assess the cumulative effects of the proposed DAM, we need to first adjust the cumulative effects of the current DAM program.

In the previous DAM rule, we assumed vessels would not fish during the restricted period and there would be a loss due to forgone revenues and the cost of moving the gear out of a DAM zone. According to Clapham and Pace (2000), 6 DAM zones would have been triggered in 2000. The SAM rule encompassed 4 of the 6 DAM zones. One DAM zone was in Canadian waters and, therefore, out of U.S. jurisdiction. One DAM zone remains. Specifically, DAM Area 8 from June 20th to July 6th. In the SAM EA we assumed vessels would choose not to fish, incur the loss of revenues and the cost of moving gear out of the DAM zone, which was assessed at $325K for the lobster fleet and $275K for the sink gillnet fleet (Table 6.0.1). Therefore the total cumulative effects for the lobster and sink gillnet fleet reported in the last SAM EA were $2,173K as a lower bound and $5,933K as an upper bound (Table 6.0.2).

Table 6.0.1.
Total forgone revenues for the lobster and sink gillnet fleet associated with DAM by area

| | DAM Lobster | DAM Sink Gillnet |
|---|---|---|
| DAM Area | | |
| 1 | 1,302,000 | 1,101,240 |
| 4 | 802,615 | 678,857 |
| 5 | 352,760 | 298,367 |
| 6 | 180,200 | 152,415 |
| 7 | 205,324 | 173,511 |
| 8 | 324,979 | 274,870 |
| Total | 3,167,878 | 2,679,260 |

Under the proposed DAM action, the lower and upper bound cost for both fleets are $47K and $113K, respectively (Table 6.0.2). The lower and upper bound cumulative effects based on the proposed DAM EA are $1,620 and $5446K, respectively. These updated cumulative effects are lower than the cumulative effects reported in the SAM rule.

Table 6.0.2
Summary of cumulative effects of the Gear, previous DAM, and SAM regulations as reported in the last SAM regulation, and the updated cumulative effects with the proposed DAM regulation by fleet.

| Fleets | | 1997 | 2000 | 2001 | Total | SAM | DAM | Cumm | Proposed DAM | Cumulative Effects |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Gear regulations | | | | SAM | Previous | | | |
| Lobster | LB | 129 | 191 | 849 | 1,169 | 153 | 325 | 1,647 | 27 | 1,349 |
| | UB | 276 | 539 | 3,915 | 4,730 | 320 | 325 | 5,375 | 82 | 5,132 |
| Gillnet | PT | 0.3 | 109 | 99 | 208.3 | | 275 | | | |
| | LB | | | | | 43 | | 526.3 | 20 | 271 |
| | UB | | | | | 75 | | 558.3 | 31 | 314 |
| Total | LB | 129.3 | 300 | 948 | 5,847 | 196 | 600 | 2,173 | 47 | 1,620 |
| | UB | 276.3 | 648 | 4,014 | 5,847 | 395 | 600 | 5,933 | 113 | 5,446 |

In the previous DAM rule we assumed all vessels would choose not to fish. Therefore, the total cost was forgone revenues plus the cost of moving gear, as a result of the previous DAM being a complete closure. However, modified gear is now being allowed under this proposed DAM rule, and we now conclude that the majority of the vessels can absorb the cost of converting to low entanglement risk gear, continue to fish and earn profits. The cost of converting the gear is less than total forgone revenues for these vessels. That is the reason the updated cumulative industry effects with the proposed DAM are lower, compared to the cumulative effects of the latest SAM rule.

Finally, the lower and upper bound annual cumulative effects for the lobster fleet under the proposed DAM action are $1,349K and $5,132K, respectively (Table 6.0.2). The lower and upper bound annual cumulative effects for the sink gillnet fleet are $271K and $314K, respectively.

## 7.0 FINDING OF NO SIGNIFICANT IMPACT

Impacts to society, both beneficial and adverse, were evaluated in this document and were determined to not be significant. The identification of gear modifications that could be implemented within a DAM, as described in this document, are expected to have short-term, site-specific negative impacts on the fishing industry. DAM gear modifications are also expected to have positive effects on right whales by reducing the risk of entanglement.

Public health and safety is not expected to be significantly affected by implementation of DAM gear modifications. Requiring fishermen to modify lobster trap and anchored gillnet fishing gear in DAM zones could result in fishermen being dislocated to unrestricted areas in order to resume fishing. Access to these unrestricted areas may require traveling further from home ports, which may expose fishermen to greater risk. Alternatively, fishing effort may become relocated closer to shore, which may present less risk. There is no evidence, however, that gear modifications within the DAM areas will result in significant impacts to public health and/or safety.

The exact location of a DAM zone cannot be predicted in advance because the area is created in response to the unexpected observation of a concentration of right whales that meets the DAM trigger. These areas are candidates for restrictions due to the presence of right whales. While these areas are valuable in spatial and temporal characteristics offering benefits for right whale protection and recovery, these geographic areas do not have unique characteristics. There is no evidence that DAM zones would have unique geographic characteristics.

The effects on the human environment from DAM gear modifications are not likely to be highly controversial. The impact of gear modifications within an individual DAM zone may be controversial to the fishing community, but the overall effects on the human environment are not expected to be highly controversial. These DAM events are limited in geographic area and in time which automatically restricts the scope of the effects on the human environment.

It is impossible to identify the exact individuals likely to be affected by this proposed rule because the time and area of DAM zones cannot be predicted in advance. The analysis in this EA uses previous sighting data to predict the number and location of DAM zones. This analysis provides sufficient information and insight into the potential effects associate with the implementation of DAM in future years. While the exact location and frequency of future DAM zones cannot be predicted, sufficient information exists which indicates that the effects cannot be characterized as highly uncertain. The implementation of fishery restrictions based on the delineation of a DAM zone is not expected to result in any unique or unknown risks. Restrictions on fishing areas or gear types are not unusual and are already implemented in order to meet objectives of the Magnuson-Stevens Act, MMPA and ESA.

There is no evidence that implementation of DAM gear modifications as a management tool to reduce the risk of entanglement to right whales establishes a precedent for future actions with significant effects or represents a decision in principle about a future consideration. The justification for DAM can be found in the BOs drafted for the multispecies, monkfish, spiny dogfish and lobster fisheries. The use of DAM as a management tool has been determined to be important in order for the agency to meet objectives under the MMPA and ESA. It is an independent action being implemented to achieve a specific objective and is therefore not expected to establish a precedent for future actions.

Section 6.0 of the EA examines the cumulative effects of this proposed rule. Based on the information presented, it does not appear that this action will result in cumulatively significant impacts.

There is no evidence that the implementation of DAM gear modifications will adversely affect entities listed in or eligible for listing in the National Register of Historic Places or will cause loss or destruction of significant scientific, cultural, or historic resources. In addition, the result of DAM gear modifications will be temporary site specific restrictions on fishing practices. Compliance with these restrictions is, therefore, not likely to result in the permanent loss or destruction of resources.

NMFS has determined that low entanglement risk gear identified in this proposed action will sufficiently reduce the risk of entanglement to right whales. In order to avoid jeopardy, the Reasonable and Prudent Alternative (RPA) for the BOs require NMFS to implement management measures that will reduce the risk of serious injury and mortaltiy to right whales. Moreover, the RPA specified that NMFS must be able to respond to observations of concentrations of right whales in areas with fishing gear by requiring prompt removal or *modification* of that gear to reduce the risk of entanglement to right whales, and, thereby, avoid jeopardy. Therefore, this proposed measure for inclusion under the DAM programs is not likely to adversely affect or jeopardize the continued existence of right whales. In addition, it is expected that other protected marine mammals, to the extent their distribution and abundance coincides with concentrations of right whales, will benefit from the imposition of DAM gear modifications. There is no evidence that threatened or endangered species will be adversely affected by DAM gear modifications. Similarly, there is no evidence that implementation of DAM gear modifications is likely to result in a violation of a Federal, state or local law for environmental protection. In fact, DAM gear modifications would be expected to support Federal, state and local laws for environmental protection because it is expected that their goals and objectives would be similar to those of the MMPA and ESA. The implementation of DAM gear modifications would not result in any actions that would be expected to result in the introduction or spread of a nonindigenous species.

In view of the analysis presented in this document, it is hereby determined that the implementation of DAM gear modifications, as described in section 3.1 of this document, will not significantly affect the quality of the human environment with specific reference to the criteria contained in NAO 216-6 implementing the National Environmental Policy Act. Accordingly, the preparation of an Environmental Impact Statement for this proposed action is unnecessary.

William T. Hogarth, Ph.D. Date
Assistant Administrator for Fisheries

## 8.0 REGULATORY IMPACT REVIEW (RIR)

A Regulatory Impact Review (RIR) for all regulatory actions that are of public interest is required by NMFS. The RIR does three things: 1) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; 2) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; and 3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed regulations are a "significant regulatory action" under certain criteria provided in Executive Order 12866. The purpose of the Regulatory Flexibility Act (RFA) (5 U.S.C. 601 et seq.)is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. With the exception discussed below, the RFA requires agencies to conduct an Initial Regulatory Flexibility Analysis (IRFA) and Final Regulatory Flexibility Analysis (FRFA) for each proposed an final rule, respectively. The IRFA and FRFA are designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. Under the RFA, an agency does not need to conduct an IRFA or FRFA is a certification can be made that the proposed rule, if adopted, will not have a significant economic impact on a substantial number of small entities. The general intent of the RIR and RFA analytical and process requirements is to make the decision process open and transparent so that all can understand the what, where, and why of regulatory decision-making and can agree that the required steps of the process were followed. The economic analyses provide decision-makers and the public with the agency's best estimates of the impacts of proposed actions and of their alternatives.

### 8.1 Executive Order (E.O.) 12866

The RIR is intended to assist NMFS decision making by selecting the regulatory action that maximizes net benefits to the Nation.

*Right Whale Management*

The proposed action is a modification of a previous Dynamic Area Management (DAM) rule (67 FR 1133, January 9, 2002). The current DAM program contains mandatory and voluntary options that may require or request vessels to remove all lobster trap and anchored gillnet gear from a DAM zone. Under the proposed action, vessels will be allowed to fish in a DAM zone if they convert to low entanglement risk gear.

The gear regulations, including restrictions and complete closures, have been developed over several years in support of the ALWTRP. In the final DAM EA/RIR (NMFS, 2001), six potential DAM closures were identified based on 2000 right whale sightings data. The economic impact of closing these six areas was assessed. These same 2000 right whale sightings data were used to design the spatial and temporal boundaries of SAM. SAM encompasses four of the six DAM areas. One DAM area is in Canadian waters - outside U.S. jurisdiction. Therefore, economic impacts are assessed for one DAM area under the proposed modified DAM action. In the final DAM EA/RIR, the DAM zone that served as a basis for that analysis and will serve as the basis for the analysis presented here would have affected 45 vessels (29 lobster trap and 16 sink gillnet vessels) over a period from June 20$^{th}$ to July 6$^{th}$.

In addition to right whale management, anchored gillnet vessels are regulated under dogfish, monkfish and groundfish plans. Vessels may have additional fishing restriction under these plans. As a result, right whale management may in fact not incur any extra cost since these vessels may be restricted from fishing in SAM and/or DAM areas under these other plans.

*Framework for Analysis*
Net National benefits are measured through economic surpluses, consumer, and producer surplus. Within this setting, consumer surplus is associated with the value of right whales and the consumer surplus associated with seafood products supplied by the lobster trap and anchored gillnet fisheries. The value of right whale protection is comprised of non-consumptive use and non-use values. Non-consumptive use value is associated with activities such as whale watching while non-use value is associated with the satisfaction that people derive from knowing that right whales exist. Producer surplus is associated with the economic profit earned by businesses engaged in the lobster trap and anchored gillnet fisheries as well as that earned by businesses providing transportation services to individuals that want to view right whales.

The proposed action is expected to provide relief from current regulatory burden. Under the status quo, a complete closure is implemented when a DAM is triggered. Vessels may incur revenue losses, costs associated with gear removal and resetting outside of a DAM zone, plus they incur the risk of losing fishing grounds to other vessels. By allowing vessels to continue fishing in DAM zones with low entanglement risk gear under the proposed action, regulatory relief is expected.

When comparing a regulatory action to the status quo or "no action" alternative, it is the change in net National benefit that becomes the focal point of analysis. Vessels that convert to low entanglement risk gear to avoid a DAM closure may increase right whale protection when DAMs are not triggered and right whales are present. Allowing modified gear in a DAM zone minimizes entanglement risk to right whales while allowing fishermen to continue fishing in the area. If vessels are allowed to fish in a DAM zone with modified gear, we also expect some positive change in consumer surpluses associated with the lobster and seafood industry. Further, the proposed DAM action should result in an increase in producer surpluses for the fishing industry since they can continue fishing in the DAM zone. Therefore, net national benefits should increase under this proposed action since we expect an increase in consumer and producer surpluses associated with the lobster and gillnet fisheries.

As long as vessels will be able to fish inside the DAM zone (provided they use conforming gear) any change in the market supplies of lobster or seafood products would be unaffected. Therefore, any positive impact on seafood consumer surplus would be the same under any of three proposed gear alternatives. This means that any difference in net National benefit will be associated with differences in the cost of gear modifications under the PA or NPA's. Then the ensuing analyses focuses primarily on identifying the most cost effective regulatory alternative.

## 8.2 Regulatory cost to Lobster and Sink Gillnet Fleets for DAM

Under 3 alternatives, excluding status quo, vessels must convert their gear to fish in the DAM zone. This proposed rule is an incentive based program. If vessels convert to low entanglement risk gear , as specified under the PA, and a DAM is triggered within their fishing area, they will not have to remove their gear. For analytical purposes we can assess the cost of converting the gear that is being fished within the DAM area only. However, vessels that fish in a DAM zone are likely to have gear fishing elsewhere. As an alternative analytical approach, a vessel could choose to convert all their gear to low entanglement risk gear since it is all subject to future and potential DAM zones. In this EA we analyze the second approach. That is, a vessel fishing in the DAM zone will choose to convert all their gear.

Under the PA, low entanglement risk lobster gear requires: 1) the use of neutrally buoyant or sinking line on all ground and buoy lines; 2) only 1 buoy line; 3) a weak link (WL) with a breaking strength of 1,500 pounds on the high flyer and the buoy ball; and 4) a weak link with a breaking strength of 3,780 pounds just below the water surface.[25]

Under the PA, low entanglement risk sink gillnet gear requires: 1) the use of neutrally buoyant or sinking line on all ground, buoy and anchor lines; 2) only 1 buoy line; 3) a weak link (WL) with a breaking strength of 1,100 pounds on the high flyer and the buoy ball; 4) 5 weak links of 1,100 lb breaking strength on each net panel; 5) a weak link with a breaking strength of 3,780 pounds just below the water surface (see footnote 25); and 6) a anchor with holding power of at least a 22 pound Danforth-style anchor or greater at the end of each sink gillnet string.

The difference between the alternatives is the number of buoy lines allowed per set of gear and the material composition of the buoy line. All other gear requirements defined above under the PA, are required for all the alternatives.  The following differences in alternatives are evaluated: 1) under the PA, only 1 buoy line made of 100 percent neutrally buoyant or sinking line is allowed; 2) status quo; 3) under the NPA 1 plan, 2 buoy lines are allowed per set of gear, and the buoy line can consist of 2/3 neutrally buoyant or sinking line and 1/3 poly rope and; 4) under the NPA 2 plan, 2 buoy lines are allowed per set of gear, however, the buoy line must be made of 100 percent neutrally buoyant or sinking line.

Several potential scenarios exist as to how the fishing industry may adapt to this proposed action.  The scenarios include: 1) convert to low entanglement risk gear and continue fishing in DAM; 2) choose not to fish or convert to low entanglement risk gear; or 3) fish outside of the DAM area, do not convert to low entanglement risk gear, and move gear back into DAM when it reopens.

In this section we discuss the economic impacts on the industry in section 8.2.1.  The cumulative effects of this proposed regulations with proceeding regulations are discussed in section 6.0.

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[25] During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively.  However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas.

### 8.2.1 Industry Impacts

In the final DAM EA/RIR, the DAM zone that served as a basis for that analysis and will serve as the basis for the analysis presented here would have affected 45 vessels (29 lobster trap and 16 sink gillnet vessels) over a period from June 20th to July 6th (Table 8.2.1). The lower bound industry costs for the PA, NPA 1, and NPA 2 are $47.1K, $55.4K, and $58.7K, respectively. These costs are based on a one year loan payment to convert gear. The upper bound industry costs for the PA, NPA 1, and NPA 2 plan are $113.3K, $129.3K, and $134.7K, respectively. Under status quo, total forgone industry revenues for the lobster and sink gillnet fleet under the worst case scenario are estimated at $529.5K. See Section 5.1.2, 5.2.2, 5.3.2 and 5.4.2 for details

Table 8.2.1
Summary of the lower and upper bound industry cost of converting gear under the PA, NPA 1, and NPA 2 plan by fleet, based on annual loan payments.

| Fleet | Number of Vessels | PA | | NPA 1 | | NPA 2 | |
|---|---|---|---|---|---|---|---|
| | | LB ($K) | UB ($K) | LB ($K) | UB ($K) | LB ($K) | UB ($K) |
| Lobster | 29 | 27.4 | 82.2 | 31.1 | 93.7 | 32.1 | 96.8 |
| Sink Gillnet | 16 | 19.7 | 31.1 | 24.3 | 35.6 | 26.6 | 37.9 |
| Total | 45 | 47.1 | 113.3 | 55.4 | 129.3 | 58.7 | 134.7 |

Lobster Fleet
The lobster fleet’s lower bound industry costs for the PA, NPA 1, and NPA 2 are $27.4K, $31.1K, and $32.1K, respectively. Similarly, the upper bound industry costs for the PA, NPA 1, and NPA 2 plan are $82.2K, $93.7K, and $96.8K, respectively (Table 8.2.1). Under status quo and the worst case scenario, forgone revenues for the lobster fleet are $154.8K.

Sink Gillnet Fleet
The total lower bound industry costs for the sink gillnet fleet under the PA, NPA 1 and NPA 2 plan are $19.7K, $24.4K and $26.6K, respectively (Table 8.2.1). The total upper bound industry costs under the PA, NPA 1 and NPA2 plan are $31.1K, $35.6K, and $37.9K, respectively. Under status quo and the worst case scenario, forgone revenues for the sink gillnet fleet are $374.7K.

## 8.3 Initial Regulatory Flexibility Act Analysis

The regulatory flexibility analysis is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. In addition to analyses conducted for the Regulatory Impact Review (RIR), the regulatory flexibility analysis provides: 1) a description of the reasons why action by the agency is being considered; 2) a succinct statement of the objectives of, and legal basis for the proposed rule; 3) a description and where feasible, an estimate of the number of small entities to which the proposed rule applies; 4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; and 5) an identification, to the extent practical, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule.

<u>Description of the reasons why action by the agency is being considered:</u> The need and purpose of the action are set forth in Section 2.0 of this document and are included herein by reference.

<u>Statement of the objectives of, and legal basis for the proposed rule:</u> The specific objective of the action, along with other aspects of the right whale program, is to: eliminate serious injuries or mortalities of right whales attributable to entanglements with fishing gear. The Marine Mammal Protection Act and the Endangered Species Act provide the legal basis for this rule.

<u>Description and estimate of the number of small entities to which the proposed rule will apply:</u> In the northeast there are potentially 7,147 vessels fishing lobster gear and 312 vessels fishing sink gillnet gear (Bisack, 2000). The proposed rule, based on a retrospective analysis using 2000 right whale sightings data and 2000 Vessel Trip Report data, would affect 45 lobster and sink gillnet vessels over a period from June 20$^{th}$ to July 6$^{th}$. These vessels represent 0.4 percent (0.004=29/7,147 lobster vessels) of the lobster fleet and 5.1 percent (0.051=16/312 sink gillnet vessels) of the sink gillnet fleet in the northeast.

Under the proposed rule, if a vessel converts its gear, a Class I (length less than 35 feet) and Class II (length between 35 and 50) vessels fishing lobster gear will have profits reduced by a minimum of 3 percent (maximum of 9 percent) and 1 percent (maximum of 2 percent), respectively (Table 8.3.1). A Class I (length less than 40 feet) and Class II (greater than 40 feet) vessel fishing sink gillnet gear will have profits reduced by a minimum of 0.4 percent (maximum of 0.7 percent) and 1.2 percent (maximum of 1.9 percent), respectively.

Table 8.3.1
Summary profit reductions based on annual loan payments for gear conversion costs under the preferred alternative (PA), non-preferred alternative 1 (NPA 1)and non-preferred alternative 2 (NPA 2) plan by vessel length class and fleet, with annual loan payments in parentheses.

| | Length Class | Length | Number of Vessels | Profit Reductions PA LB | PA UB | NPA 1 LB | NPA 1 UB | NPA 2 LB | NPA 2 UB |
|---|---|---|---|---|---|---|---|---|---|
| Lobster | | | | | | | | | |
| | Class I | L<36 | 13 | 0.030 ($944) | 0.090 ($2,833) | 0.034 ($1,072) | 0.103 ($3,230) | 0.035 ($1,107) | 0.107 ($3,337) |
| | Class II | 35<L<50 | 16 | 0.008 ($944) | 0.024 ($2,833) | 0.009 ($1,072) | 0.027 ($3,230) | 0.009 ($1,107) | 0.028 ($3,337) |
| Sink Gillnet | | | | | | | | | |
| | Class I | L<40 | 4 | 0.004 ($295) | 0.007 ($514) | 0.004 ($321) | 0.007 ($540) | 0.005 ($330) | 0.007 ($549) |
| | Class II | L>39 | 12 | 0.012 ($1,547) | 0.019 ($2,420) | 0.015 ($1,918) | 0.022 ($2,790) | 0.016 ($2,106) | 0.023 ($2,979) |

Under status quo, if a lobster vessel chose not to fish outside the DAM zone, annual revenues would be reduced by 5 percent if these vessels chose not to fish from June 20th to July 6th. It is important to note that this represents forgone revenues for one DAM zone, and a vessel could be subject to multiple DAM zones or closures that are extended in time and space. Annual forgone revenues would be reduced by approximately 9 percent for a sink gillnet vessel if they also chose not to fish outside the DAM zone from June 20th to July 6th.

Under the NPA 1 plan, if a vessel converts its gear, Class I (length less than 35 feet) and Class II (length between 35 and 50 feet) vessels fishing lobster gear will have profits reduced by a minimum of 3 percent (maximum of 10 percent) and 1 percent (maximum of 3 percent), respectively (Table 8.3.1). A Class I (length less than 40 feet) and Class II (greater than 40 feet) vessel fishing sink gillnet gear will have profits reduced by a minimum of 0.4 percent (maximum of 0.7 percent) and 1.5 percent (maximum of 2.2 percent), respectively.

Under the NPA 2 plan, if a vessel converts its gear, Class I (length less than 35 feet) and Class II (length between 35 and 50 feet) vessels fishing lobster gear will have profits reduced by a minimum of

3.5 percent (maximum of 10.7 percent) and 1 percent (maximum of 3 percent), respectively (Table 8.3.1). A Class I (length less than 40 feet) and Class II (greater than 40 feet) vessel fishing sink gillnet gear will have profits reduced by a minimum of 0.5 percent (maximum of 0.7 percent) and 1.6 percent (maximum of 2.3 percent), respectively.

Description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records: The proposed rule would not impose any additional reporting, record-keeping, or compliance requirements. Thus, no new skills would be required for compliance.

Identification of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule: No duplicative, overlapping, or conflicting Federal rules have been identified.

Substantial Number of Small Entities Criterion:
All sink gillnet and lobster commercial vessels that fish north of 40E N. latitude would be effected. All such operations, where they exist, are assumed to be small business entities, given the information provided above and the standard that a fish harvesting business is considered a small business if it is independently owned and operated and not dominant in its field of operation, and if it has annual receipts not in excess of $3.5 million. The number of entities that engage in fishing in the manner that would be prohibited is considered few.

Significant Economic Impact Criterion:
The outcome of "significant economic impact" can be ascertained by examining two issues: disproportionality and profitability.

**Disproportionality: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities?** All business entities participating in the lobster and sink gillnet fisheries are considered small business entities, so the issue of disproportionality does not arise.

**Profitability: Do the regulations significantly reduce profit for a substantial number of small entities?** Economic impacts on a individual vessels are evaluated here. We investigate whether a vessel can absorb the cost of converting to low entanglement risk gear, continue to fish and earn profits. Since these types of decisions are based on an annual time frame, we estimate a vessel's annual revenues, variable and fixed expenses, and labor to determine their profits on average. Next, we measure their profit change given they incur the cost of converting their gear. In addition, a break even analysis is performed for lobster vessels, where the break-even quantity represents the pounds of lobster a vessel must land to start making a profit. If the break-even quantity is negative, vessels will go out of business. For details of the following analyses see Sections 5.1.2,

Vessels are divided into length classes. In the lobster fleet we define the following three length classes: 1) Class I vessels are 35 feet or less; 2) Class II lobster vessels are between 36 and 49 feet; and 4) Class III lobster vessels are 50 feet or greater. In the sink gillnet we have the following two length classes: 1) Class I sink gillnet vessels less than 40 feet; and 2) Class II vessels 40 feet and greater.

We estimate a lower and upper bound cost of converting to low entanglement risk gear by vessels class for the lobster and sink gillnet fishery. In the lobster fishery, the lower bound estimate represents the average amount of gear fished according to fishing records in the 2000 Vessel Trip Report (VTR) logbook. The upper bound estimate represents the gear conversion cost given a vessel fishes the legal maximum amount of traps. For example, lobster vessels fishing offshore (LCMA 3) exclusively can fish 1,800 traps and vessels fishing all other areas can fish a maximum of 800 traps. In the sink gillnet fishery, a point estimate of gear fished is estimated from the 2000 VTR logbook. The lower bound gear conversion cost is based on a vessel using a lower cost 1,100 pound weak link (1/4" polyester rope at $0.073). The upper bound estimate is based on a sink gillnet vessel choosing a break-away float (with a unit cost of $3.00), which is a new product targeted for 2002 production.

Annual loan payments range between a low of $295 for a Class I sink gillnet vessel to a high of $2,979 for a Class II lobster vessel (Table 8.3.1). We assume vessels will take a 3 year loan at 8.5 percent to pay for the up front cost of converting their gear.

The proposed regulation affects 45 lobster and sink gillnet vessels, which represent 0.4 percent (=29/7,147)of the lobster fleet and 5.1 percent (=16/312) of the sink gillnet fleet in the northeast. A Class I and Class II vessel fishing lobster gear will have profits reduced by a minimum of 3 percent (maximum of 9 percent) and 1 percent (maximum of 2 percent), respectively. A Class I and Class II vessel fishing sink gillnet gear will have profits reduced by a minimum of 0.4 percent (maximum of 0.7 percent) and 1.2 percent (maximum of 1.9 percent), respectively.

Under the proposed rule, we expect that lobster and sink gillnet vessels will be able to convert to low entanglement risk gear, continue to fish, and earn profits.

Under status quo, if a lobster vessel chose not to fish outside the DAM zone, annual revenues would be reduced by 5 percent if these vessels chose not to fish from June $20^{th}$ to July $6^{th}$. It is important to note that this represents forgone revenues for one DAM zone, and a vessel could be subject to multiple DAM zones or closures that are extended in time and space. Annual forgone revenues would be reduced by approximately 9 percent for a sink gillnet vessel if they also chose not to fish outside the DAM zone from June 20$^{th}$ to July 6$^{th}$. In conclusion, the proposed action reduces the regulatory burden on the individual vessel by allowing them to continue fishing in a DAM zone with modified gear.

Therefore, lobster and sink gillnet vessels are likely to convert to low entanglement risk gear since the reduction in profits would be much lower than a complete closure of the DAM zone.

<u>Description of significant alternatives to the proposed rule and discussion of how the alternatives attempt to minimize economic impacts on small entities:</u>

The absolute magnitude of right whale protection provided by these regulatory alternatives can not be quantified, but they can be ranked. The preferred alternative (PA) provides the greatest protection followed by the non-preferred alternative 2 (NPA 2) plan and the non-preferred alternative 1 (NPA 1) plan. The reasoning is as follows: Under the PA plan only 1 buoy line is allowed per set of gear, however, 2 buoy lines are allowed under the other 2 alternatives. Fewer vertical lines (ie. buoy lines) in the water reduces the risk of entanglement. The NPA 2 plan requires 100 percent neutrally buoyant or sinking line in the buoy line and, based on current information, this is considered more protective than a buoy line composed of 1/3 poly rope. Therefore, the NPA 2 plan is considered more protective than the NPA 1 plan.

The lower and upper bound cost per vessel for a Class I and Class II lobster and sink gillnet vessel is less under the PA compared to the NPA 1 and NPA 2 plan (Table 8.3.1). Under status quo, a vessel fishing lobster gear could incur annual revenue losses of approximately 19 percent if they chose not to fish and convert their gear in June and July. Under the PA plan, a lobster vessel’s profits may decreased by a maximum of 9 percent (upper bound, Class I vessel, Table 8.3.1). Similarly, under status quo, a Class I and Class II sink gillnet vessel could incur revenue losses up to 35 percent if they chose not to fish during a DAM restricted period. Under the PA plan, sink gillnet’s vessels profits were reduced by a maximum of 1.9 percent if they converted to low entanglement risk gear.

## 9.0 APPLICABLE LAW

### 9.1 National Environmental Policy Act

NMFS has prepared this document as an environmental assessment for this action with a finding of no significant impact.

### 9.2 Endangered Species Act

A BO on the three Fishery Management Plans (FMP) for the monkfish, spiny dogfish, and multispecies fisheries, and the Federal regulations for the lobster fishery was issued on June 14, 2001. The BO concluded that the FMPs and lobster regulations jeopardize the continued existence of right whales. Therefore, NMFS defined a Reasonable and Prudent Alternative (RPA) with multiple management components to the proposed action. Among the RPA elements was a mechanism for the expedited implementation of restrictions in areas outside designated right whale critical habitat, which NMFS has termed Dynamic Area Management (DAM). The proposed action is intended to identify gear modifications that may be required as one management option for protecting right whales inside a DAM zone and is within the scope of the RPA for the DAM program. Therefore, subsequent consultation is not necessary to meet the requirements of section 7(a)(2).

### 9.3 Marine Mammal Protection Act

The proposed action facilitates implementation of the ALWTRP and will have no adverse impact on marine mammals.

### 9.4 Paperwork Reduction Act

This proposed action does not contain a collection-of-information requirement for the purposes of the Paperwork Reduction Act.

### 9.5 Essential Fish Habitat

The area affected by the proposed action has been identified as EFH for species in the Northeast groundfish, sea scallops, monkfish, and spiny dogfish fisheries. This proposed action will have no adverse impact on EFH, therefore, an EFH consultation is not required. The basis for this determination is that the gear types involved, anchored gillnet and lobster trap gear, have minimal and short-term impacts on EFH.

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